MODEL AIRPLANE NEWS

THE WORLD'S PREMIER R/C MODELING MAGAZINE

HOT-DOGGING TECHNIQUES

December 1996

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97 SCRATCH-BUILDERS' Plans Guide

— see page 83

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Macchi MC.200—

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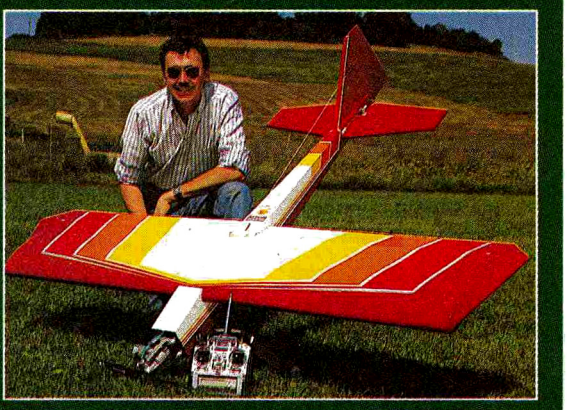
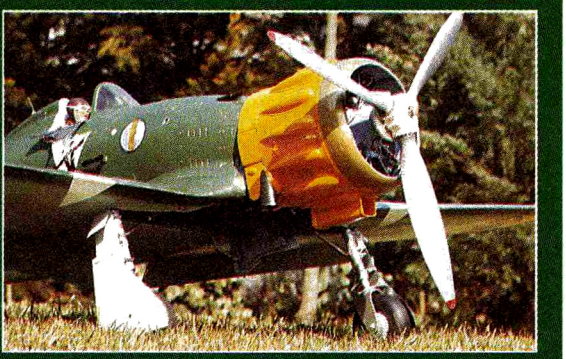




ON THE COVER: the Midwest Super Stinker is an exciting, IMAA-legal aerobatic biplane for the modeler who wants performance; inset—Dave Baron hovers the Jerry's Big Boy giant, fun-fly model from Morris Hobbies—an absolute hoot to fly!

ON THIS PAGE: top—Dave Baron poses with Jerry's Big Boy giant-size, fun-fly machine from Morris Hobbies; middle—Jim Onorato (left) and Bob Van Tassel get ready to put the Midwest Super Stinker biplane through its paces; bottom—the Macchi MC.200 Saetta, a giant-size, precision-scale Italian WW II fighter, is this month's construction article.

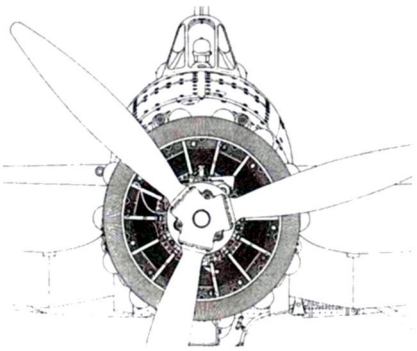
EDITORIAL

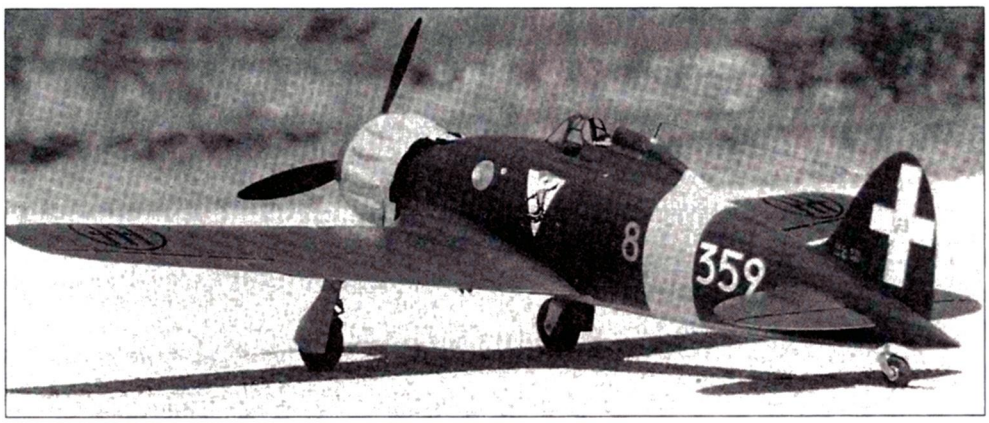
by TOM ATWOOD

MAGNIFICENT MACCHI

This month's construction article comes all the way from Italy and is sure to get your attention. Designed and built by Giuliano Raimondi, the Macchi 200 is an unusual scale model of one of Italy's WW II fighters. The plans are CAD designed and are the most impressive and fully detailed we have ever offered to our readers. It is also one of the largest sets of plans (nine sheets of model construction plans and five sheets of full-size scale detail views) we've ever published.

Built of traditional balsa and plywood, the Macchi 200 would be completely at home at the Scale Masters or the Top Gun Scale Invitational. The Macchi's large 1/5.2-scale size gives it a respectable wing loading and, for the dedicated scale modeler, the detail drawings include all the parts for electrically driven scale retracts. Every single piece of the model is included on these plans and I know you'll agree, Giuliano's efforts are a stunning work of art. Whether you're looking for a new project for serious scale competition or you simply want a great new set of plans for your collection, Giuliano's Macchi 200 is worthy of your consideration.





Giuliano Raimondi's beautifully detailed Macchi MC. 200 Saetta.

CYBERNEWS

Scratch-building, one of the oldest modeling pursuits, is being revolutionized by recent developments in computers. If you have access to a PC, designing stronger, lighter, better-performing models has never been easier. Airfoils are available on disk and downloadable from libraries on the Net. Performance-analysis software can predict how a new design will fly long before it has been built. Plans can be precisely drawn in CAD software and printed on your dot matrix or laser printer. In recent years, software has proliferated in all of these categories (see "Software Survey for Modelers," in the October '96 *Model Airplane News*).

As you might expect, surveys show that the percentage of modelers who own PCs is twice that of the general population. A great deal of online discussion of modeling topics now occurs in newsgroups such as rec.models.rc.air, on CompuServe's Modelnet, or in the various list services catering to modelers, such as our own R/C Soaring Exchange (to subscribe, email: soaring-request@airage.com). The amount of information available to the computer-literate modeler is surely to continue to grow, but how does one keep track of all of these developments?

To better cover the expanding use of computers in R/C modeling, we are pleased to announce a new column, "R/C Cybernews," by long-standing contributor Bill Griggs. Bill is active on CompuServe Modelnet, runs a modeling website dedicated to speed 400 racing (http://ourworld.compuserve.com/homepages/griggsbill), and is a computing skills instructor for the New York State Police. His hobby interests include slope soaring, sailplanes, electrics and helicopters. Bill will be covering everything from Web developments to relevant CDs to the wide variety of software applications designed for modelers. The column will start on a bimonthly basis; please let us know what you think and what you'd like to see covered! You can email *Model Airplane News* at: man@airage.com, or email Bill directly (see his column, page 146).

At a time when technology is advancing, the most basic needs of the modeler still remain the same. When at the workbench, we all seem to have a fondness for inexpensive but functional tools, materials and hardware—the basic items that help us build that next ship and that keep our stable of models ready for the flying field. Don't miss our guide this month to 20 of these simple but important gems that will help you build and fly better.

THE BEST OF MODEL AIRPLANE NEWS PLANS

With the winter months approaching, the question arises for many: what will I build for the next flying season? We have some answers you'll want to check out; see the special plans directory published in this issue for a listing of 200 of our bestsellers.

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WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," **Model Airplane News,** 100 East Ridge, Ridgefield, CT 06877-4606; e-mail: man@airage.com. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we can not respond to every one.

AERO-TOWING

A while back, I passed an R/C field and saw something I had never seen before—a Sr. Telemaster aero-towing a T-tail glider. Unfortunately, I couldn't stop and chat with the pilots and, since then, when I've passed by the field, nobody has been there. I have a couple of gliders, and I would like to try this form of flying. Does *Model Airplane News* have any information on this subject? I would be grateful for the help.

ROBERT DELALLO
Newtown, CT

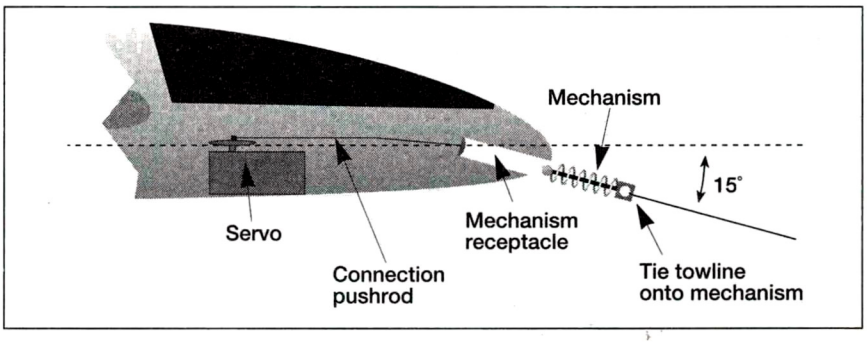
Robert, aero-towing is an exciting way to get your glider into the air, especially if there's a crosswind. It's not a new type of flying because I remember some R/C pilots trying it in the late '70s; however, with today's more sophisticated towing and radio equipment, the success rate of completed tows has grown.

First, you must determine the glider's weight and whether the engine on the tow-plane is strong enough to pull the glider. The placement of the tow-line and release mechanisms is also important. On the tow-plane, it's best to place the tow-line on top of the plane about halfway between the CG and the TE. The glider mechanism (the guys I tow usually use the Graupner release mechanism) is in the nose of the glider and usually has a 15-degree negative angle when compared with the glider's centerline. Using separate servos, both ends of the line can be released, and the tow-plane-attachment mechanism is usually a wire loop with a straight piece of wire in the middle. The servo pulls the straight wire down allowing the tow-line to be released. In either case, the release has to be smooth so that it doesn't get caught on anything.

Next is the tow-line; we have been using a 70-foot-long, 80-pound test line with a foot-long piece of bungee cord spliced in about 10 feet from the tow-plane. The glider end of the tow-line has the Graupner attachment tied onto it while the tow-plane end has a loop that's hooked around the wire in the release mechanism. A red flag is tied to the end of the tow-line to make it visible in the air after the glider has been released.

Just as I do with the full-scale tow-plane, I fly a check flight with the R/C tow-plane to make sure that everything is in working order. Then we pick the smoothest spot on the field, hook up the planes and proceed to take off. Once the tow-plane has taken up the slack in the line, throttle is applied slowly and smoothly. If you punch the throttle input, you'll jerk the glider around too much, possibly causing it to rise into the air too soon or careen out of its straight takeoff path. Also, the tow-plane could hang an unwanted left because of torque. The idea is to keep the tow-plane on the straightest possible run; this involves using the rudder for directional control during takeoff.

The glider pilot needs to stay straight behind the tow-plane and keep his wings level. This involves using the ailerons as well as the rudder. A little down-elevator is held as the glider commences its ground roll to keep it from lifting off too soon with minimal airspeed. Once the glider has gained sufficient speed, up-elevator is applied to get the glider flying; the tow-plane is still on the ground but in a wheel-landing, tail-up position. When the tow-plane reaches the correct speed, some up-elevator is applied, and they're airborne.



Airspeed is one of the most critical factors in aero-towing. Once the planes are off the ground, if the airspeed is too fast, the glider could be yanked around in an uncontrollable fashion. If the airspeed is too slow, the glider will fall out of the sky; the only recourse the glider pilot will have is to dive the glider for airspeed and hit the tow release. The glider will hopefully have enough altitude to recover. The airspeed is determined by the pitch attitude of the tow-plane during climbout. The airspeed required depends entirely on the weight of the glider being towed. You'll have to experiment with this in order to establish the airspeed required by your glider.

The tow-pilot must develop an ability to watch his plane and the glider he's towing. This is one way he'll know if more or less airspeed is needed. The glider pilot can concentrate on his glider and communicate his needs to the tow-pilot. The two pilots should be standing fairly close together and talk to each other when necessary. I find that calling the direction of the turn to the glider pilot helps to keep the planes properly aligned. Full-scale glider pilots try to stay on the outside of the turn during the climb, but when you're standing on the ground this can be extremely difficult to determine, so the glider pilot should try to keep the line stiff and follow the tow-plane as best he can. Once the desired altitude is reached, release the glider and go thermal it. After release, the tow-plane's throttle should be reduced gradually, and the engine should be allowed to cool down during the descent.

That's essentially the gist of aero-towing; the main considerations are the airspeed and keeping the planes straight. As with all R/C endeavors, practice makes perfect; it also makes for piles of balsa wood, but we don't like to talk about that. Good luck with your towing! RP

HOW-TO ARTICLES WANTED

Do you have a construction technique, building method, or design innovation that you'd like to share with other readers?

Why not publish your ideas in *Model Airplane News*?

For more information, contact assistant editor Debra Sharp (203) 834-2900.

Hints & KINKS

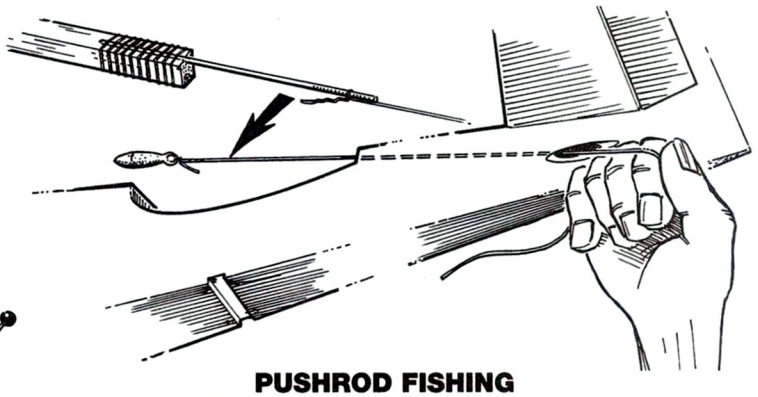
by JIM NEWMAN

Model Airplane News will give a free one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman c/o Model Airplane News, 100 East Ridge Ridgefield, CT. 06877-4606. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.

LITTLE BIT, BIG CHUCK

To make a large drill-chuck grip a tiny drill bit, first put the bit into a pin vise, remove the knob or handle, then place the pin vise into the larger chuck.

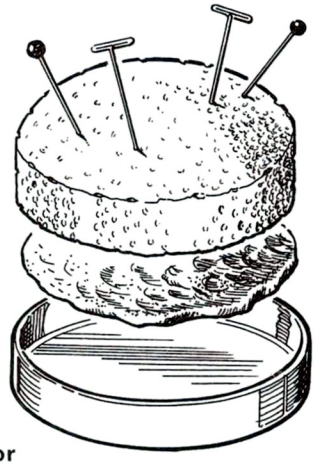
Emile Alline, Lynnwood, WA



PUSHROD FISHING

Drop a weighted monofilament line through the pushrod exit. When it appears in the servo bay, remove the weight and tie it to the end of the threaded rod. Pull the rod up through the opening, then quickly screw on the clevis. The weight can be a 1/4-ounce (28g) fishing sinker or a small rod of solder crimped on the line.

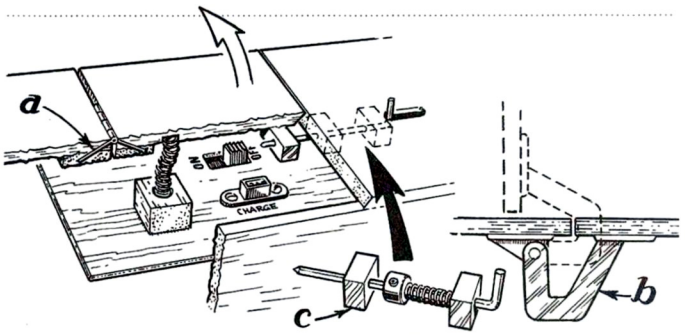
David Crown, Des Plaines, IL



WEIGHTED PIN CADDY

Hammer a large wheel-balance weight flat, place it in a plastic or tin lid, then jam a dome-shaped piece of insulating foam, such as Styrofoam, on top of it. The weight prevents the caddy from sliding around while you add or remove pins.

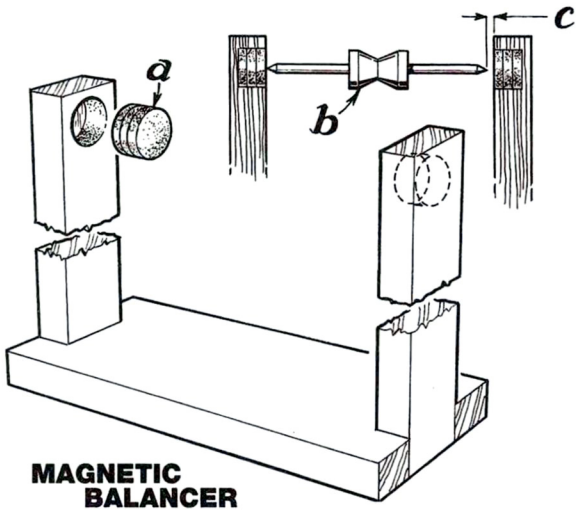
Robert Foster, Exeter, Devon, England



SPRUNG HATCH

Protect your switch and charge socket from oil and dirt under this sprung hatch, using regular R/C hinges (a) and a ballpoint-pen spring. For more clearance, use commercial offset hinges (b). The latch can be an old Allen key or a bent wire sliding in hardwood blocks (c). Another ballpoint-pen spring and a wheel collet provide the spring loading for such an assembly.

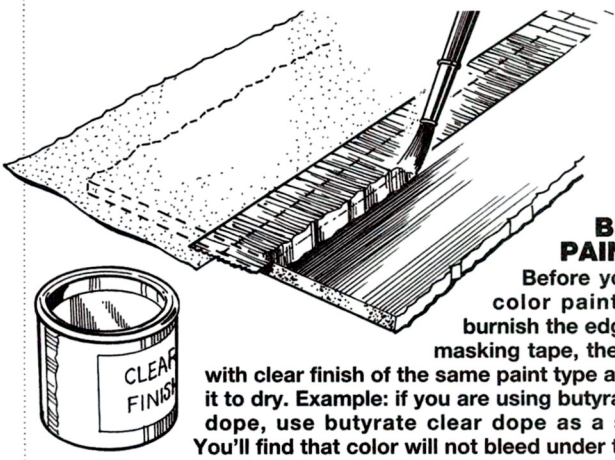
Scott Marelius, Roseda, CA



MAGNETIC BALANCER

Make the stand shown out of pine or even hard balsa. Recess three round Superpower magnets (a) into each upright, and secure them with a spot of CA. Put the shaft of a Du-Bro or Robart propeller balancer (b) in a lathe, then turn a point on each end. Note: distance (c) must be no more than 1/16 inch (1.5mm), and the vertical clearance must be sufficient to accommodate your largest propeller. Get the required magnets from Radio Shack or a craft store.

Jimmy Littlefield, Lubbock, TX



NO-BLEED PAINTING

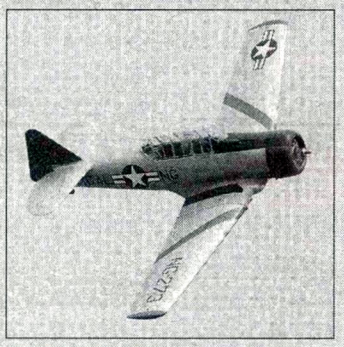
Before you apply color paint, firmly burnish the edge of the masking tape, then seal it with clear finish of the same paint type and allow it to dry. Example: if you are using butyrate color dope, use butyrate clear dope as a sealant. You'll find that color will not bleed under the tape, and if the clear finish bleeds, it will not be visible.

Denis Shields, Timaru, New Zealand

A simple solution for sick carburetors

by JOHN KOHLER

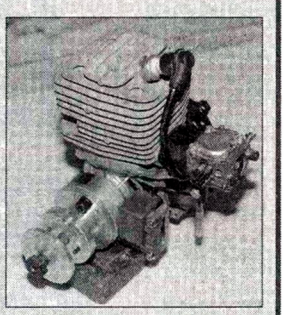
Gas Carburetor TROUBLESHOOTING



This Ziroli* AT-6 Texan built by Fred Stagg is powered by a Zenoah G-62. When we flew in Team Scale at Top Gun '96, we made sure the carb screen was clean before we competed. A dirty screen can rob you of up to 300rpm. Knowing your engine is in tiptop condition makes it easier to concentrate on flying.

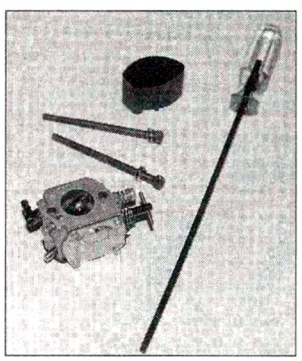
THE POPULARITY of giant-scale models has grown in recent years mostly because of reliable and user-friendly gasoline engines such as the Zenoah G-38 and G-62, Sachs* 3.2 and Quadra* 42. One thing these and other gasoline engines have in common is the Walbro carburetor. When an engine's power starts to sag or it simply doesn't perform as it did before, most modelers automatically think it's a needle-valve-adjustment problem. Stop! Don't be in such a hurry to turn the needles. In most cases, once they have been set, the needle valves (both high-end and idle) can remain at that setting for the life of the engine. A better place to start troubleshooting is the sediment screen that filters the incoming fuel.*

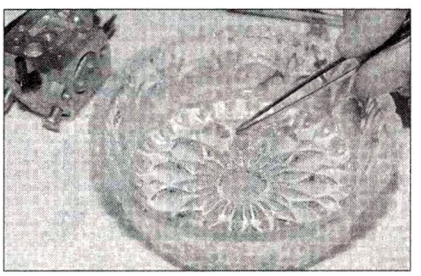
Here's how to clean the filter screen in the Walbro carburetor:

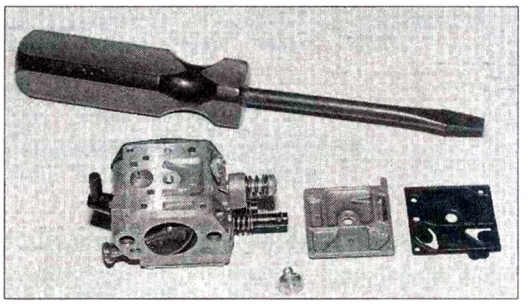


The Zenoah G-62 is typical of the popular gasoline engines used by giant-scale fliers. Keeping the carb clean is the first step toward consistent engine performance.

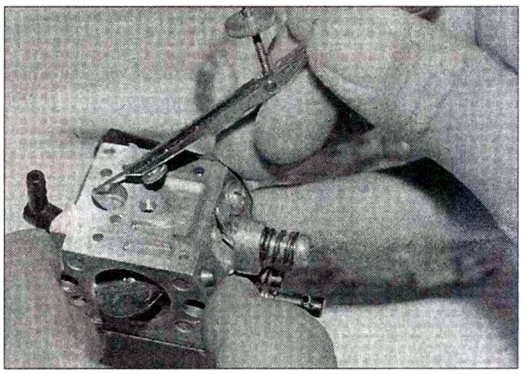
1 First, find a clean place to work. I have done this trick at the flying field, but it's better to do it in your workshop with clean paper laid down and good overhead lights. Remove the carburetor body from the engine by using a 5/32-inch Allen wrench. Two long cap-head bolts hold it in place. Once you have removed the bolts, pull the carb off, remove the plastic spacer block and be careful not to damage the gasket.





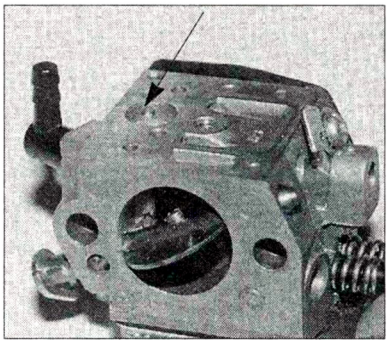


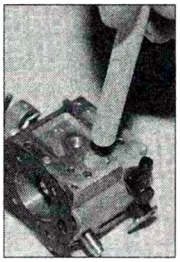
2 Use a common screwdriver to remove the access cover from the side of the carb. Some carbs have four small screws, one in each corner of the cover, while others like the Zenoah G-62 have a single large screw in the center of the cover. If this is the first time you've removed the cover, the cover and gasket may be stuck in place. If they are, gently pry the cover loose. Generally, it will pop free at one corner. Before you remove the rubber diaphragm/gasket, be sure to examine its position so that when it's time to reassemble it, you can reinstall it properly. This is also a good time to examine the diaphragm for defects. Occasionally, when an engine sits dormant during the off-season, the rubber can dry out and crack. This will cause poor engine performance. You can buy a replacement diaphragm from B&B Specialties* or from your local lawn-mower repair shop.



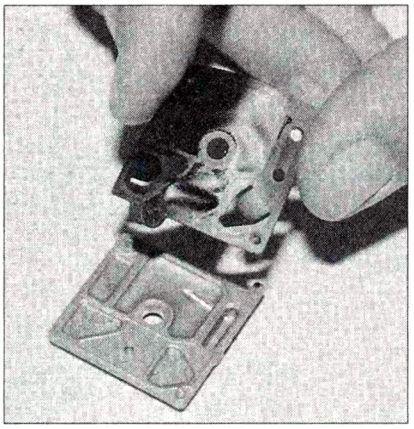
3 After the cover and diaphragm/gasket have been removed, the screen will be visible. It is partially recessed in a small, round orifice. Check the screen for any obvious debris. Before you remove the screen, you may want to flush out large particles with gasoline. Using a hobby knife or some other pointed tool, gently pick the screen out by the edge. Be careful not to distort the screen's shape because if you do, it will not be easy to get a good fit when you reinstall it.

4 Flush the screen out from the back with clean gasoline (you can also dip it in a glass bowl of gas). Hold the screen up to the light to see whether all particles have been removed. It doesn't take much debris to foul up the fuel flow, so make sure it is clean. While the carb is open, you may wish to flush out the exposed ports and screen orifice.

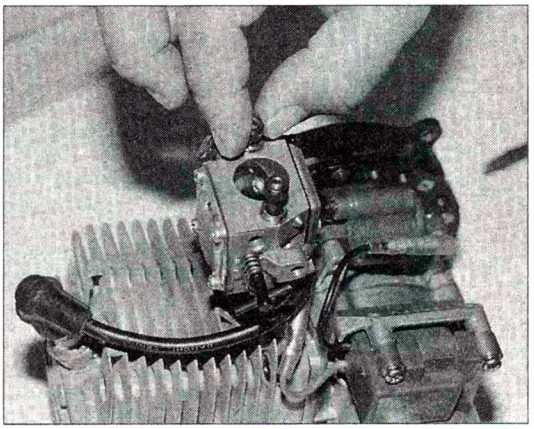




5 Replace the screen with the ridge facing up. Place the screen on top of the orifice and make sure it is level. You can use a dowel to gently push the screen down to the small ridge on which it will rest. Note that the screen, when properly seated, does not cover the fuel inlet hole (arrow), which is in the side of the screen orifice.



6 Replace the diaphragm/gasket and the cover, and screw the cover back into place. Make sure that the diaphragm is in its original position. Tighten the screw firmly to properly secure the cover.



7 Reinstall the carb body onto the engine, along with the plastic spacer block, and tighten the two long cap-head bolts to secure it in place. Do not use Loctite* on any of the screws or bolts because it will make removing the carb much more difficult. Just tighten everything, and you're done.

To greatly reduce the frequency of screen cleanings, use a filter in your fuel can as well as in the fuel feed line that goes to the carb. Check and clean the screen two or three times per season, and you'll keep your plane where it belongs—in the air!

*Addresses are listed alphabetically in the Index of Manufacturers on page 151.

Planes Worth Modeling

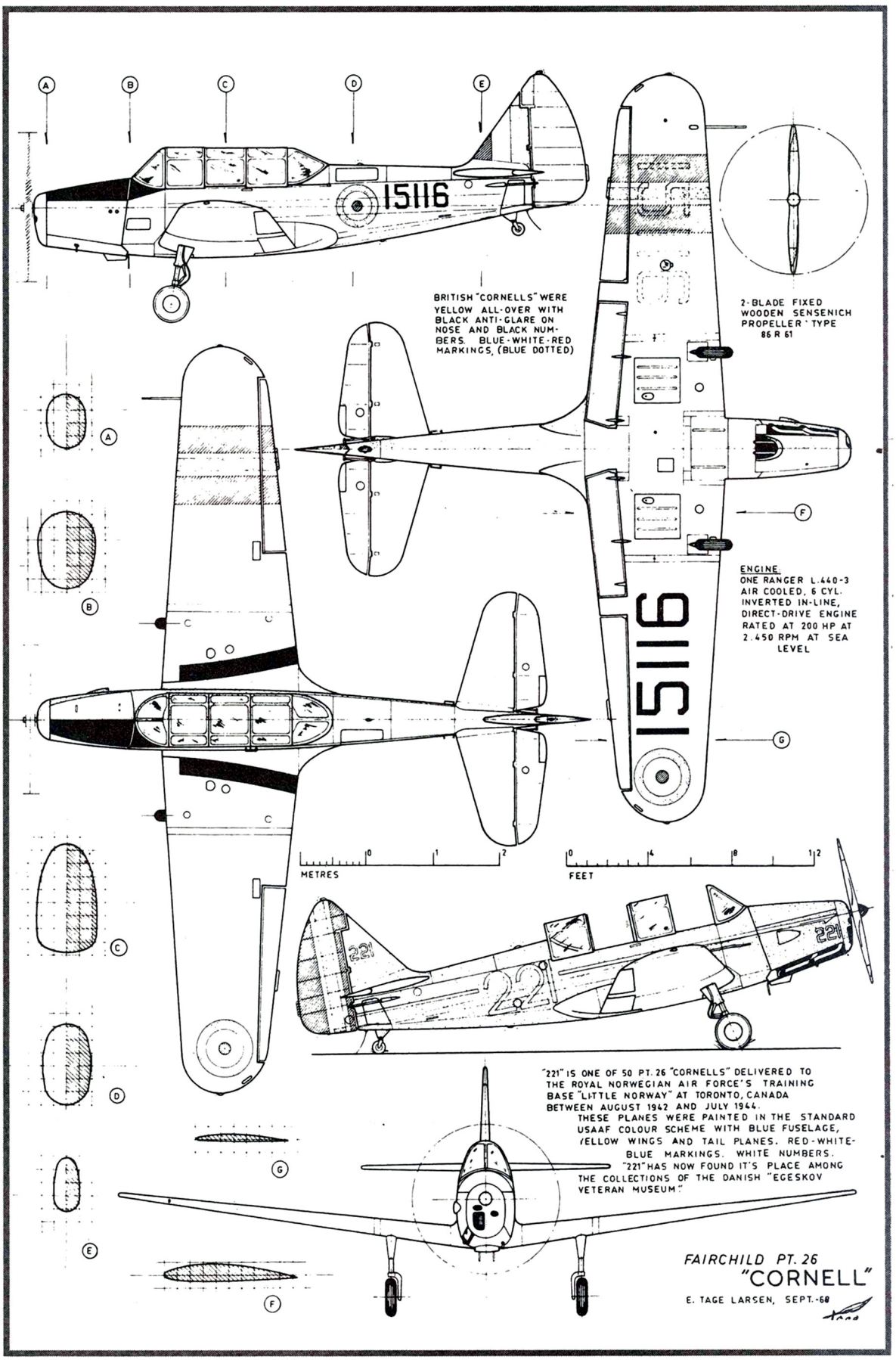
Fairchild PT-26

3-View Documentation for Scale Modelers

The Fairchild PT-26 Cornell was a winterized version of the U.S. Army's PT-19A that was used by the British starting in March, 1941. Fairchild built 670 aircraft known as the Cornell I; Fleet under contract built 807 as the Cornell II and then built an additional 250 PT-26Bs as the Cornell III. Most carried RAF or RCAF markings and were painted yellow. But because they were paid for with U.S. Army funds, they also carried the appropriate U.S. Army designation and serial numbers.

SPECIFICATIONS

Wingspan: 35 ft., 11 in.
Length: 27 ft., 8 in.
Wing area: 200 sq. ft.
Empty weight: 2,020 lb.
Gross weight: 2,630 lb.
Max. speed: 128mph



MODEL AIRPLANE NEWS HOW TO

Hotshot Flying— *Stinger* Style

by STINGER WALLACE

We all know that model airplanes should be flown safely and, especially, that you should only experiment with one at a safe altitude and with a minimum number of spectators present. I strongly suggest that whenever you experiment and aren't comfortable with your airplane, you should be two, three, or four "mistakes" high so that you don't lose your airplane or cause any damage. Be familiar with your airplane and its flying characteristics. Each plane is different, and you should know what to expect if something goes wrong. My personal feeling is that it doesn't matter how far you have to walk to retrieve your model; it always beats having to rebuild it.

MANEUVERS

I'll cover some of my favorite maneuvers, step by step, in hopes that the information may help those of you who wish to improve your flying skills. I still keep a .40-size, high-performance airplane to help keep my reflexes tuned up. Such a plane is capable of any of the following:

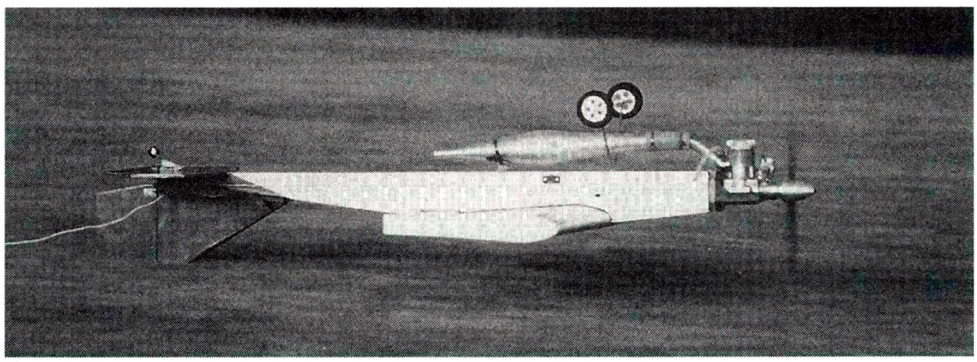
• The low inverted pass down the runway. I started doing this stunt (my favorite!) with small sport planes many years ago. Believe me, it took several crashes to learn this maneuver. I've been able to fly most types of R/C aircraft (sport, scale, small and large) inverted. Some, of course, owing to their design and airfoils, are a lot easier to fly than others. But without a doubt, airplanes that were designed for aerobatics and pattern-style flight are much more suitable for inverted flight. A plane with a fully symmetrical airfoil design on the wing and the horizontal stabilizer in line with the airflow of the wing is best for this particular maneuver.

I like to set up for a low inverted pass by turning the airplane upside-down on the downwind leg of the pattern, then I make my turn slowly while keeping the plane inverted, and then I line up with the runway center line. As the plane approaches the runway, I maintain control but let it slowly descend to a comfortable altitude, and I complete the pass while holding a constant altitude.

Always consider where you're flying and the effects of different wind, humidity and temperature conditions. All these factors play an important part in keeping the airplane airborne and prevent it from meeting the ground unexpectedly.

In some cases, as you can see in the picture that was taken by Dan Parsons at the Joe Nall Memorial in 1993 (below), you can actually touch the ground with the vertical fin and still continue to fly with just the right amount of down-elevator. In this case, the field was soft grass, circumstances were just right, and the airplane continued to fly. This particular plane was scratch-built from an old set of plans that was designed by Andrews Quik Ray. It has a ¼x⅜-inch hardwood leading edge on the vertical fin that enables me to actually drag the fin on the ground. If this maneuver is performed off grass, there will be no damage. On asphalt, the most extensive repair will be a Mono-Kote patch on the fin tip or perhaps a broken prop.

You must realize that, if you take these risks, you are very likely to crash-land occasionally. Over the years, I have hit the ground when I wasn't trying to. It's a chance you take, but I've been very fortunate and have successfully completed the maneuver many times.



This is what I call a "rudder bump." The plane's fin and rudder are completely flat on the top; this allows me to drag the rudder along the grass for quite a distance (photo by Dan Parsons).

To keep elevator control and to be able to feel it through the transmitter stick, you must maintain sufficient speed. If you can't feel the elevator response through your thumb, you're in trouble; power up and go around. I've gone as far as putting landing gear on both the top and the bottom to serve as a training tool, but this does affect flight performance. Remember, reverse your control action when flying inverted.

• The rolling circle is always a crowd-pleaser. This is another maneuver that can only be completed with properly designed aircraft. You'll have far less trouble performing this maneuver with an airplane that grooves well and handles smoothly.

My favorite sequence is to roll the airplane with right aileron while using the elevator to turn the airplane in a left circle. Again, keep in mind that location, wind and temperature have a great deal to do with being able to successfully complete this maneuver. I not only try to concentrate on what the airplane is currently doing, but I also mentally prepare for the next move that I want the plane to do.

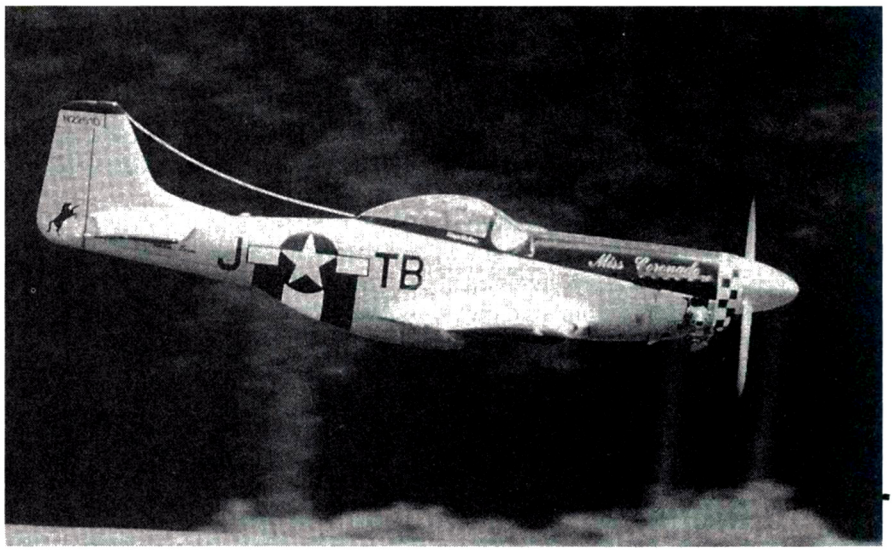
It works best for me to set up for this maneuver while the airplane is approaching me from the left and to start moving the aileron to the right. When the right wing goes down, apply down-elevator to turn the plane to the left. Hold slight down-elevator until the right wing has rotated to a horizontal position (airplane inverted). At this point, you should again be close to neutral on the elevator, while still holding

slight right aileron tension. Now, switch to slight up-elevator as the right wing rotates to vertical. This continues the left turn of the circle.

When the right wing returns to horizontal (airplane upright), you should have elevator back to neutral and should have completed about ¼ of the circle if you are doing a four-roll, rolling circle. Repeat this entire sequence for the next roll and ¼ circle, etc. You may also find that the slower you roll the airplane, the more rudder you need to apply during the knife-edge point of the roll. If this is the case, when the right wing is in the down position, you may need left rudder; when the right wing is at the top, you may need right rudder. First, try the maneuver without rudder and see how your plane performs. When you have learned this much, you'll be able to vary the maneuver to include as many rolls as you wish (or are able) to complete.

For me, the most difficult maneuver is to do only one roll while completing a 360-degree circle. When you fly with the wings vertical (knife-edge), you will have to use some rudder to hold the fuselage straight during the maneuver. The faster you perform the rolls, the less you will have to use the rudder. It takes practice to make that determination. Do whatever works best for you and your airplane. Remember that the method I've described may not apply in a competitive situation. If you enter a contest, you must observe the rules that require a certain number of rolls, etc.

• The slow roll is another maneuver that appeals to the crowd and is fun to do. I like to start a long (1,000-foot) slow roll about 500 feet away from me in one direction and complete it about 500 feet in the other direction. This maneuver is similar to the rolling circle, although you concentrate on keeping the airplane flying in a straight line, as if on an imaginary string.



My P-51 blazes past in a low flyby. This is one of the most thrilling maneuvers for spectators because they're anticipating a maneuver of some type, but I like to fool them by flying the straight line and blasting to vertical at the end of the run (photo by Dan Parsons).

Start either up- or downwind, in whichever direction you feel more comfortable rolling your plane. While flying in a straight line, apply the aileron to roll in the direction you want. Let's use the right-hand roll as an example. Start by applying light right aileron (you may require light up-elevator). Then, as the right wing goes down to vertical, start applying the necessary left rudder to keep the fuselage straight, just as if you were flying knife-edge for a short time. Because the right wing is now slowly coming up to horizontal (inverted), you'll need the necessary down-elevator pressure to maintain level flight. As the aircraft passes horizontal, you again approach vertical, and this time, you'll need right rudder. Remember, use the elevator to control aircraft direction whenever the wings are vertical.

If you stop to think about these movements, you'll see that they are, in fact, a smooth, continuous movement of the sticks, which you will realize is a lot easier said than done. It only comes with practice.

• The flat turn is a somewhat simpler, yet interesting-looking maneuver to accomplish while maintaining a level attitude. Its effect is more appreciable with a slower model, such as a Piper Cub, rather than with a pattern-type aircraft, although an Ultimate is also ideal for this maneuver.

As a matter of fact, some aircraft will not slip through the air sideways to a point at which you can even tell that they are flat turning. For example, if you use a Cub to perform a left-hand flat turn, start the maneuver at a higher altitude than you think you'll need. This is crucial because you drastically slow the airplane down during this type of turn, and it could stall and

This P-38 looks very majestic in the air. The maneuvers that I do with this plane are a little more scale-like. Quick, snappy maneuvers don't quite make it with this type of plane.

require more altitude than you initially thought to allow you to recover. (Believe me, I'm talking from personal experience; this has happened more than once.)

Start at a level attitude at about ½ throttle, and apply left rudder until you notice the airplane starting to yaw left. Then apply the necessary right aileron to keep the wing horizontal. It will probably take a few tries before you succeed, because to prevent the plane from wanting to snap, you'll need to hold just the right amount of left rudder, elevator and right aileron.

When you're able to hold the plane in the flat turn, you can practice making the circle smaller and smaller as you improve; but remember that the tighter the circle, the slower the airplane is actually flying, and that greatly increases your chance of a stall.

• The M-wadd. Now on to something a lot faster and extremely radical! I've never seen this maneuver demonstrated by anyone else, nor have I seen it diagrammed in a magazine. I call it the "M-wadd." Scott Broughton (another of our club members) and I scratch-built two identical, 72-inch, ⅓-scale BD-8s, with 4.2 engines. We were flying these particular planes when we discovered this maneuver. I've found that only planes designed for aerobatics with a short-coupled fuselage (for aerobatics) will do this maneuver. Planes with a long tail moment will not do it.

Start the maneuver during level flight, at full power and with plenty of altitude. Pull back on the elevator quickly as if to begin an inside loop, then suddenly throw both sticks to the upper corner of the gimbal. What seems to work best is to go to the full-power, right rudder while pushing full down-elevator and left aileron. When it's done successfully with the proper type of airplane, the airplane goes from straight-and-level forward flight into a tail-forward tumble that comes out in a snap-roll-type stall. As it does so, I let the sticks go back to neutral for just a second, but maintain full throttle, and fly the airplane out of the stall. This is definitely not a maneuver for a beginner.

Don't do this maneuver with an airplane that wasn't designed or modified to withstand the tremendous forces that are being applied to the entire airframe. You're literally threatening to tear the tail off the fuselage when you do this one.

It's also very likely to come out of the stall in one of many possible directions. This maneuver, in particular, can only be mastered through hands-on experience. All airplanes handle differently until you get accustomed to how the plane handles the controls given to it. I mentioned that the left rudder and right aileron worked best on my plane, but the opposite might work best on yours. Try it!

If this ½-scale Extra were any bigger, I would be able to climb in and fly it myself. This is a great aerobatic platform that gives hours of flying pleasure.

• The whoosh-by. This last maneuver is fairly simple, and I usually do it at the end of my flight because it can be performed without the assistance of an engine (dead-stick). It can be done with just about any type of airplane, but the very last step may vary somewhat, depending on the strength of your wing. This is a somewhat violent maneuver, so only do the whoosh-by while no one else is flying, and be sure that no one will come near your flying pattern.

I begin to set up for this stunt after all other maneuvers have been done and I'm at the end of my flight. First, I climb to an altitude at which the airplane is barely visible, then I kill the engine and continue to soar around until I can tell by testing the throttle stick that the engine is completely dead. I then point the airplane straight down at an imaginary point at least 50 feet in front of me, and I continue to dive toward that point on the ground until the last possible second (about 100 feet of altitude) before I pull back hard and quickly on the elevator, just before the plane would hit the ground. Then I pull the nose up enough to gain adequate altitude to bring the airplane around, and I hope I judge all conditions well enough to land the airplane dead-stick and so that it rolls out right in front of me.

The sound of the air "whooshing by" the airplane without the engine running will definitely surprise you. It gives you an idea of how much force is actually being exerted against the skin of the aircraft.

When you attempt this maneuver, be sure to have plenty of altitude when you pull out of the dive, and allow enough air speed to make the necessary turn and to glide in dead-stick. Until you know just what to expect from your plane, remember that walking definitely beats rebuilding.

On one occasion, I had changed from one computer radio to another without checking the elevator percentage that the first transmitter was programmed for, and guess what? You probably got it right—total destruction.

I hope that this chapter will help some of you newer pilots try the more complex aspects of R/C modeling. These maneuvers have provided me with hours of enjoyment over the years, and I hope that they'll do the same for you.

ABOUT THE AUTHOR

Stinger Wallace

Stinger was born at an Air Force base and was a "military brat" until his father retired when Stinger was six. At age 12, he heard an .049 U-control airplane behind his home and became hooked. In 1977, he bought his first 6-channel radio and a Sig Super Sport 3-channel trainer. Stinger loves multi-engine aircraft and, in the Unlimited R/C Air Races, his planes reached 195mph. His main interest is IMAA-size aircraft, particularly the WW II warbirds. He and Walt Bardwell are constructing a 14-foot-span B-29, which will weigh around 48 pounds with four Zenoah G-23s—well within the AMA's 55-pound limit.

Air SCOOP

by CHRIS CHIANELLI

New products or people behind the scenes; my sources have been put on alert to get the scoop! In this column, you'll find new things that will, at times, cause consternation, and telepathic insults will probably be launched in my general direction! But who cares? It's you, the reader, who matters most! I spy for those who fly!

Easy as ABC

Some postulate that mastering R/C flight is the priority! At the early learning stage, all other aspects of the hobby—like building and finishing—will serve only as distractions and will fall into place in good time. I confess, I agree—at least on some level anyway. I can still remember when I entered the hobby 27 years ago; though I was enthusiastic about flying R/C planes right from the start, it wasn't till after I had soloed that I was hopelessly and forever bitten by the "R/C bug." The point is if we want to get newcomers into the hobby, we better hurry up and get them flying (and hopelessly bitten by "the bug") before they get distracted by the many other "tech toys" that the modern age has to offer.

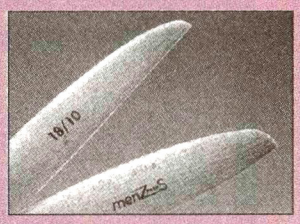
Hobby Shack's new Air Master 40T fits well into this plan of attracting newcomers to the hobby and holding their interest. Here are the reasons:

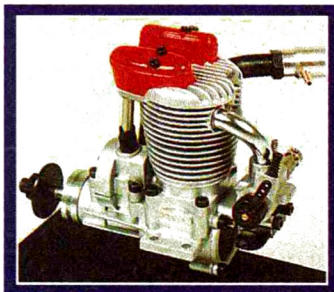
- Factory specs predict it should be a great flier: wingspan—61 inches; area—675 square inches; weight—5 pounds. Those figures boil down to a wing loading of 17 ounces per square foot; in a word—excellent!
- It's good-looking. Fact: good looks excite beginners. With its one-piece molded cabin, turtle deck and colorful finish, the Air Master is not your typical boxy trainer.
- It's 90 percent ready to fly; instant gratification is what beginners of today want.
- Last, but not least, the price is $89.99!

For more information, contact Hobby Shack, 18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (714) 964-0827; fax (714) 962-6452.

Where do they get those wonderful props?

You know those super-precision props used by TOC, IMAC and unlimited race pilots? Did you ever wonder what they are and where to get them? One of the props used by these élite modelers is from the Menz line, which is made in Germany using high-quality beechwood. According to U.S. distributor Cactus Aviation, the power tip of the Menz prop produces more power at a given rpm and makes less noise than other props. They are offered in two styles: the wide-blade, high-lift Standard Series is normally used on longer-stroke motors that produce more low-end power while the slimmer Scimitar-shaped Ultra Series is designed for shorter-stroke, piston-ported motors whose torque band is produced at a higher rpm level. Both are offered in two- and three-blade configurations, and sizes range from 18x10 to 32x10. For more information, contact Cactus Aviation Models, 10380 E. Heritage Pl., Tucson, AZ 85730; phone/fax (520) 721-0877.

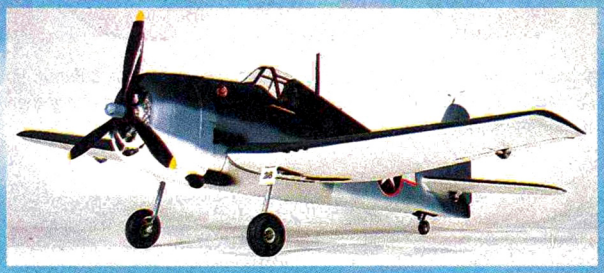




No, Saito is not coming out with a new Red-Head line. Although, as prolific a manufacturer as it has been in past, I'm certain this would come as a surprise to no one. This is a photo of an early prototype from a Japanese magazine. Like other Saitos, however, this

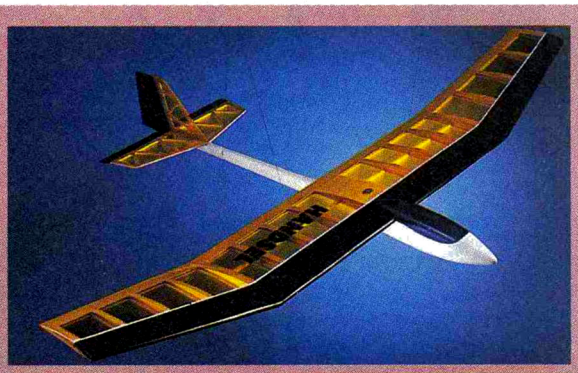
Saito .56

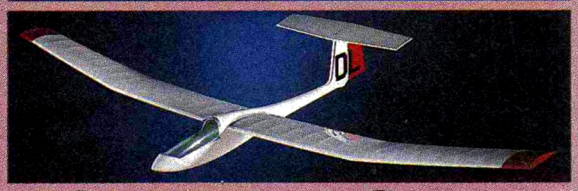
new .56 will be offered in standard FA and GK (Golden Knight) versions. Based on the proven .50, the .56 uses the same case and mounting-bolt pattern as the .50 FA. While the new .56 weighs the same as the .50, Horizon claims an astounding 1,000rpm gain over the .50 turning a 12x7 prop. A significant gain to say the least. They go on to say the .56 has a 2,200 to 2,300rpm idle with "right now" throttle response. My experience with many Saitos in the past bears out this claim. For more information, contact Horizon Hobby Distributors Inc., 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.



THE PACIFIC DEFENDER

The venerable carrier-based F6F Hellcat was without a doubt the Navy's most heavily used fighter with an incredible 9 to 1 kill ratio to its credit. Wing Manufacturing introduces its 1/8-scale replica of this famous Pacific warbird. The model features a rugged A-frame balsa fuselage, sheeted foam-core wings, scale control surfaces, inner and outer flaps and a fully cowled engine. This deluxe kit includes two full-size plans sheets; a step-by-step instruction manual; precision-cut foam wing and tail cores; a detailed canopy; a heavy-duty cowl; laser-cut formers and bulkheads; an extensive hardware package; a full-color decal sheet; a molded scale engine face; a partial cockpit with an instrument panel; and all the necessary sheeting to finish the entire airframe. The Hellcat was designed for good handling throughout the speed range. According to Wing Mfg., aerobatic and dogfight maneuvers are performed easily with exceptional recovery and no tendency to tip-stall, and those beautiful flap-down, carrier-style spot landings can be performed with ease. Specifications: wingspan—61 inches, wing area—671 square inches, weight—8 to 10 pounds, power requirements—.60 to .90 2-stroke or .90 to 1.20 4-stroke. For more information, contact Wing Mfg., 306 E. Simmons, Galesburg, IL 61401.

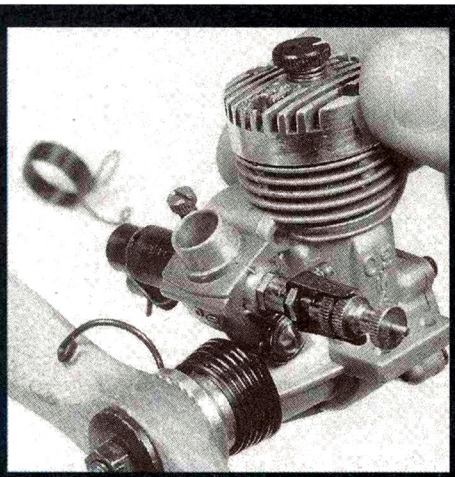




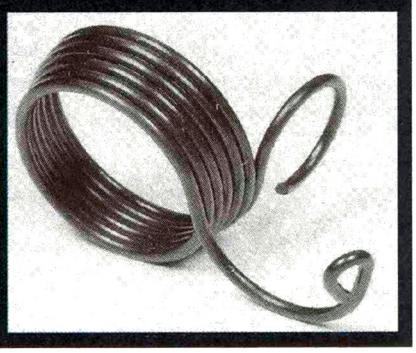
Save 'n' Soar

Do you like to soar, save time and save money? If you do, then finish reading this Scoop. Hobby Lobby International has two little sailplanes for you. The Handsel 1200 (yellow wing) has a 47-inch wing with a proprietary airfoil that is slightly under-cambered at the trailing edge with a slight washout at the tips. Weight without electronic equipment is 10.3 ounces. Handsel has a finished fiberglass fuselage, balsa wing and tail components that come fully covered. The recommended power is the efficient Speed 400, and the price is $159.

Next up is the Discus LS Mini Sailplane that sports a 56.5-inch wingspan and has a flying weight of about 11.6 ounces (with two miniservos) as a launched sailplane or a 20.6-ounce flying weight as an electric with batteries and Speed 400 power. This elegant and easily transportable model has a fiberglass fuselage and ready-built rib/spar balsa wing and stab that are ready for covering. The price is only $119. For more info on these neat little ARF thermal machines, contact Hobby Lobby Intl., 5614 Franklin Pike Cir., Brentwood, TN 37027; (615) 373-1444; fax (615) 377-6948.



When you hear the term "spring starter," most of us immediately think of the big boys with their giant-scale models powered by chain-saw engines, which often feature spring starters. Thanks to Davis Diesel, the big guys have nothing on the little guys. This new and improved spring starter, made especially for the Cox TD and Medallion .049/.051 and O.S. .10, provides easy starting for either glow or diesel operation. Made of plated spring steel, the Davis spring starter gives you the quick snap needed for those stubborn engines without using an electric starter, which sometimes can damage a small engine.



First brought to market in 1976, the spring starter is far from new. It has been selling by word of mouth all these years. Now the secret is out. Price: $5.95. For more information, contact Davis Diesel Development, P.O. Box 141, Milford, CT 06460; (203) 877-1670.

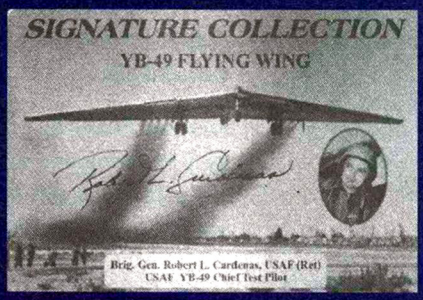
GROWNUPS HAVE ALL THE FUN

Soaring the Neutral Zone

If an enemy battle-star launches an attack on your local slope-soaring site, you can be on full-alert patrol to repel the aggressor with the new Toucan 60R—a larger version of the original Toucan from DCU Models. With lower wing loading and higher Reynolds numbers than the original 43-inch version, this 60-inch-span version flies like a dream. If you liked the original, you're going to love this one. The kit features a fiberglass fuselage, foam-core/balsa-sheeted wings and all the hardware to make the wings removable. The wing area is 470 square inches, and it weighs 30 to 32 ounces. Separate elevator and aileron-control servos are used, and mixers are unnecessary. Contact DCU Models, 45 Steel Rd., Wylie, TX 75098; (214) 429-0440; fax (214) 442-1899.

AVIATION'S MEN OF "METAL"

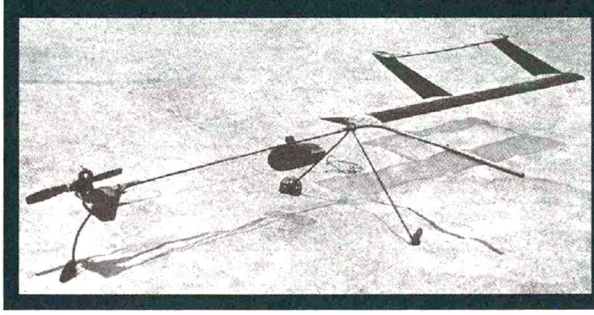
These limited-production aviation Signature Collection Cards are made of fine-quality aluminum. Some of the finest and most famous figures of aviation in the past 60 years, including test pilots, record-holders and Aces, are represented with the planes they flew. On the front of each card is an action photo of a history-making aircraft and an inset photo of the famous pilot and his or her signature. The plane's specifications and a short informative paragraph are on the back of each card. Signature cards sell for $5.95 (S&H included). A percentage of each sale will go to the Flight Test Historical Foundation for the construction of an aviation museum at Edwards Air Force Base. For more information, contact Aerospace Marketing, P.O. Box 850, Victorville, CA 92393; (800) 440-5095.



Build an icon of an era

Flair now offers the venerable deHavilland Tiger Moth in their Quarter Scale Classic Series of kits. This impressive DH-82 Tiger Moth has an 88-inch wingspan and is sure to be a crowd-pleaser at an IMMA event or at your local field. Flair promises superb engineering and a long list of scale details and innovations made possible by the model's large size. Here are just a few examples: sprung and dampened telescoping undercarriage; durable lightweight wheels with deHavilland-logo hubcaps; stainless-steel flying wires with terminators; complete closed loop (pull/pull) control system for rudder and elevators; die-stamped steel bracket; die-cut, lite-ply parts; fiberglass cowl and external detail moldings. Power requirements are .90 to 1.20 2-stroke or 1.20 to 1.50 4-stroke. For more information, contact Hobby Supply South, Inc., 5060 Glade Rd., Acworth, GA 30101; (800) 250-3683, (770) 974-0843; fax (770) 974-6243; email: hss@hway.net; homepage: www.hway.net/hss.

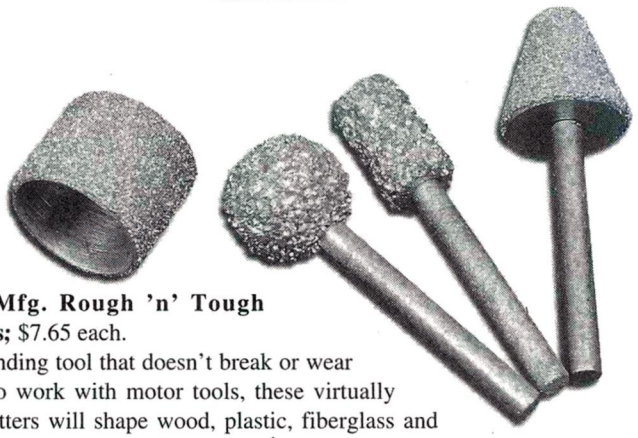
WORLD RECORD HOLDER



In 1949 this free-flight helicopter, built by Taiwanese modelers Wang Kung and Liu Li-Tien, set a world record for duration of 22 minutes, 27 seconds. They later set a distance record of 18.038 kilometers with a model of the same type.

20 Products under $20

WHERE WOULD we be without all those inexpensive items that make it easier to build and maintain our models? While some R/C items are expensive and complicated, it's comforting to know that we can count on those little gadgets to accomplish many of our modeling tasks. Here are 20 popular products that cost less than $20 but pay big dividends in convenience and performance. (See the Index of Manufacturers on page 151 for addresses of the companies mentioned below.)

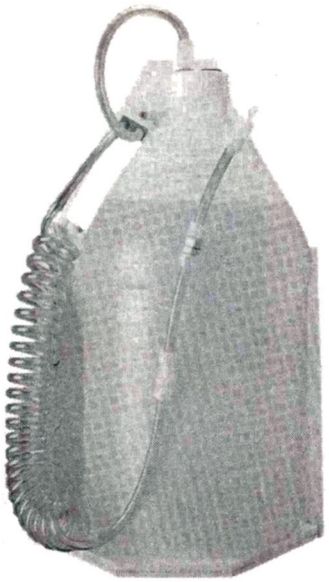


1 Robart Mfg. Rough 'n' Tough Carbide Cutters; $7.65 each.
How about a grinding tool that doesn't break or wear out? Designed to work with motor tools, these virtually indestructible cutters will shape wood, plastic, fiberglass and ceramics without overheating. They all have 1/8-inch-diameter steel shanks and come in a variety of shapes and in fine and coarse grits.

2 Du-Bro Hinge Slotter—part no. 660; $7.30.
This tool takes the hassle out of cutting slots in control surfaces for hinges. The set includes three slotting forks, a picker, a guide and one drilling template and three slotting templates for mini, standard and heavy-duty hinges.

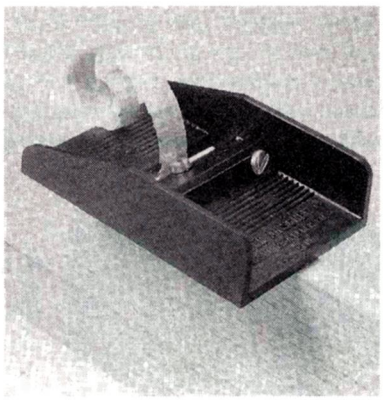
3 LDM No-Heat Trim Solvent—part no. 9500; $6.95.
Avoid the bubbles and wrinkles that can form when MonoKote trim is ironed onto itself. No-Heat is a fuel-proof solvent that activates the adhesive on Mono-Kote, and its slow-acting formula gives you time to position the trim piece before it dries. Applying attractive multicolored schemes over open structures will be easy.

4 Magnum Z-Bender; $16.95.
Tired of using two pairs of needle-nose pliers to make Z-bends in pushrod wires? This all-metal tool makes perfect Z-bends quickly and easily, and it has a rubber grip for better handling.

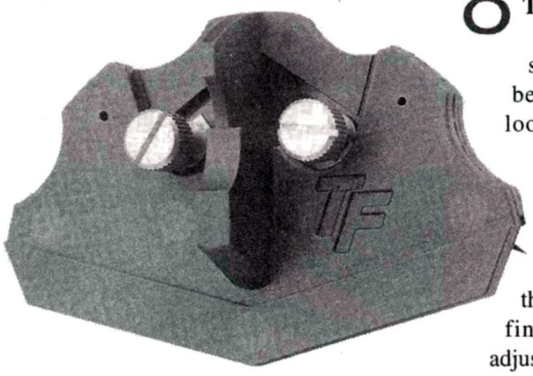


5 22nd Century Aero Products Advanced Aero Fueler; $14.95.
Now you can stop worrying about accidental fuel spills. This fueler's airtight seal also prevents fuel from being contaminated by moisture and dirt. The system includes 5 feet of coiled tubing, quick-lock fittings, a locking cap, a drilling template and all the fittings required for assembly.

6 Ace R/C Flight Pack Mini ESV—part no. 22K12; $15.95 (assembled).
Do you have enough charge in your battery pack for another flight? Take the guesswork out of knowing when it's time to quit. When it's hooked up to the battery pack, the Ace R/C Mini ESV will put a simulated flight load (around 250mA) on the pack and measure the voltage. If the indicator needle is in the green, fly away! If the needle moves into the red, it's time to recharge or replace your pack.

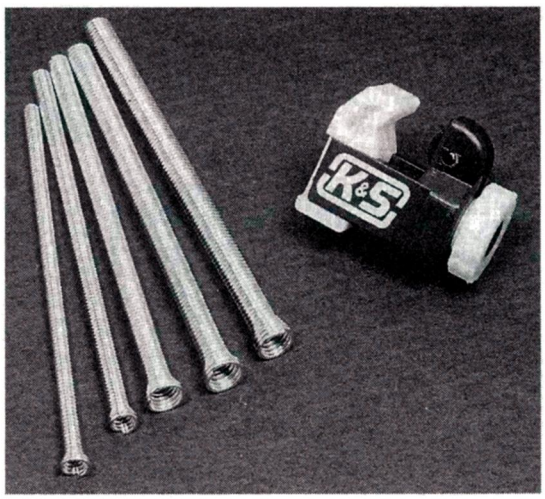


7 Master Airscrew Razor Plane—part no. MA4100; $4.95.
Making a straight leading edge or carving a balsa wingtip block can be murder with only a hobby knife and some sandpaper, but it can be a breeze with a razor plane. Master Airscrew's razor plane can round and smooth cowls and fuselages and shape edges and thin strips with great accuracy. Two adjustable stop screws set the cutting depth accurately.



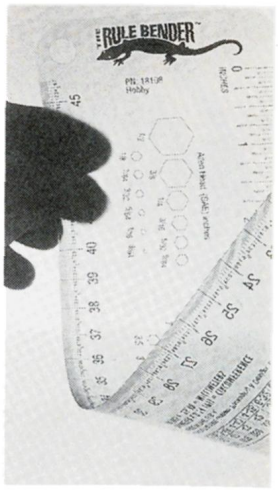
8 Top Flite MonoKote Smartcut Trimming Tool; $9.95.
With a film-covered model, straight seams are what make the difference between average models and great-looking models. With this tool, this small detail has become easier. You can cut straight, even edges in MonoKote and make virtually invisible seams. The spacer guide creates 1/8-inch or 1/16-inch overlaps, the durable plastic body has molded-in finger grips, and the blade depth is adjustable.

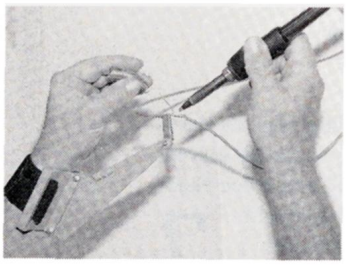
9 K&S Tubing Bender and Cutter—part nos. 321 ($2.25), 296 ($3.95).
It happens all the time. You're installing the brass tubes in your new fuel tank and need to bend the vent tube 90 degrees so that it fits into that little vent dimple at the top of the tank. Oops! You just kinked the tube. Eliminate kinking those tubes (up to 3/16-inch-o.d.) with these coil benders. And cut up to 5/8-inch-o.d. brass, aluminum and copper tubes with the cutter. Rolling the tubes between the bench and the edge of a hobby knife never produces a clean cut.



10 Bob Dively Liquid Masking Film; $4.95 (4 oz.), $12.10 (16 oz.), $19.25 (32 oz.).
How do the guys with the scale models paint those great-looking markings without getting runs or smears after they lift the masking tape? Simply brush or spray this liquid film onto any nonporous surface, draw your design or marking, and then remove the unwanted masking film with a sharp hobby knife. Paint away! You'll have razor-sharp edges—even over curved surfaces.

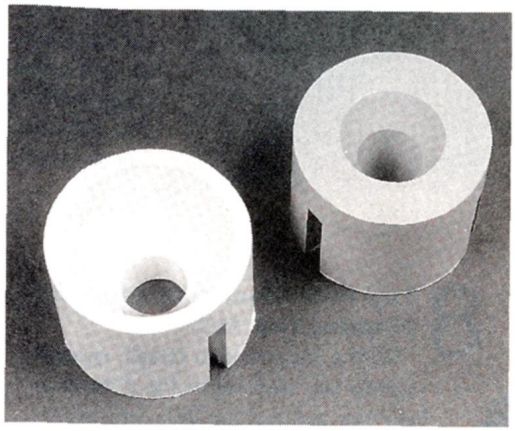
20 Products under $20



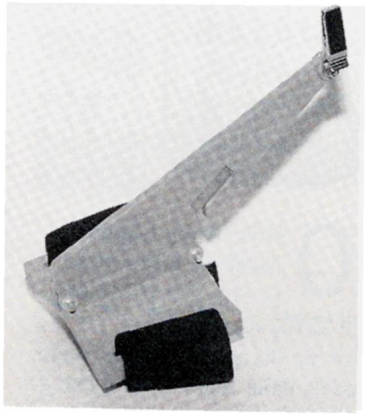


11 **Hangar 9 Super Scissors**—part no. 2500; $8.95.
Don't trash another set of scissors again. These stainless-steel shears feature a comfortable, impact-resistant, injection-molded grip and will cut anything, including heavy fiberglass cloth, heavy-gauge aluminum and copper and fiber-covering materials.

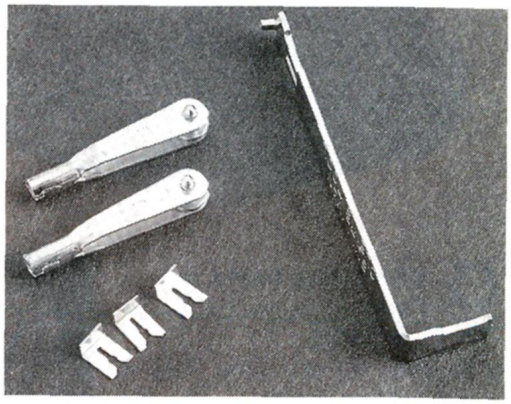
12 **Ironwood Pacific Free Hand;** $9.95.
If you're like many modelers, you often find yourself alone in the workshop and then try to do something that requires a third hand. Soldering wires together comes to mind. How do you hold the wires, solder and the soldering iron with only two hands? Ironwood Pacific has a neat little strap-on device called the "Free Hand" that solves this dilemma.



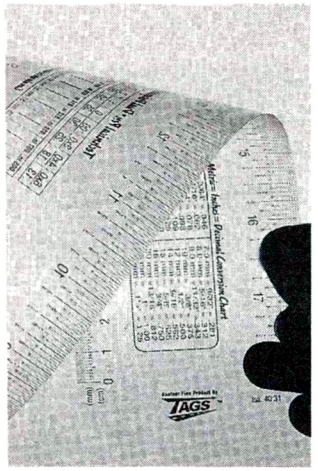
13 **Miller R/C Starting Inserts;** $8.49 to $9.25.
Do you have one of those starters with a worn-out insert that makes a better doorstop than a model-engine starter? Get a grip, and start your model without slippage with Miller R/C's replacement inserts. Sky Grip starter inserts are configured for airplanes with spinners (wide cone), and Tuff Grip inserts are designed for models that don't have spinners (small opening for the prop nut). Miller R/C inserts fit most starters.



14 **Sullivan Products Clevis Opening Tool and Gold-N-Clevises**—part nos. 524 and 525; $.95.
Have you ever put a hole in your covering with a screwdriver that slips out of a clevis that you're trying to open? Use the right tool for the job. Sullivan's clevis opening tool also has a magnetic slot to hold those small retaining clips that get lost in the grass, and it's notched to securely hold the clevis open. Trim adjustments couldn't be easier.

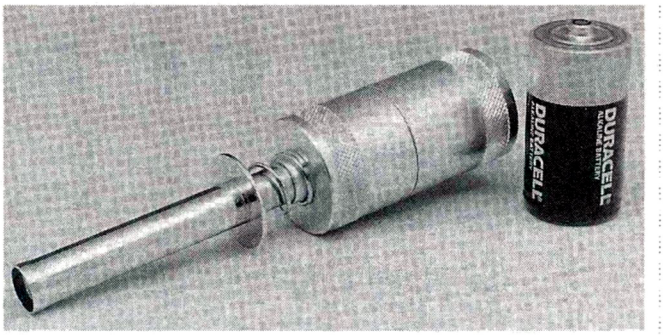


15 **Great Planes Easy-Touch™ Sanders**—part nos. GPM6169 (5.5 in.), GPMR6170 (11 in.), GPMR6172 (22 in.); $3.99, $4.99, $6.99.
These light, extruded-aluminum sanders feature wide, easy-to-grip handles, and they disperse pressure evenly over a wide area for professional results. Packages of assorted, adhesive-backed (so they stick to the sanders), 5½-inch-long sheets are available for $2.49; 12-foot rolls for longer sanders are $6.99 each.



TAGS Rule Bender—part nos. 12108 (12 in.), 18108 (18 in.); $5.95, $7.95.

With this easy-to-read, 10-mil-thick, bendable Lexan ruler, you can accurately measure curved surfaces, corners and other shapes to within .005 inch. It also has decimal equivalent and drill/tap charts, Allen-wrench templates and technical pen-point-size templates, which can also be used as piano-wire gauges.

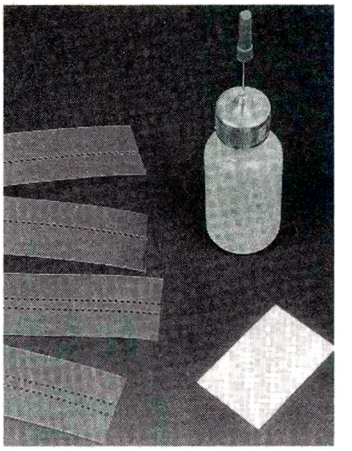


M.D. Planes Backup Glow Starter; $12.95.

How many times have you reached for your Ni-Cd glow starter and found that it had lost its charge? It has probably happened more than once. The M.D. Glow Starter doesn't need to be charged; it uses a simple "C" alkaline battery. Keep one in your field box, and you'll never have to borrow one again.

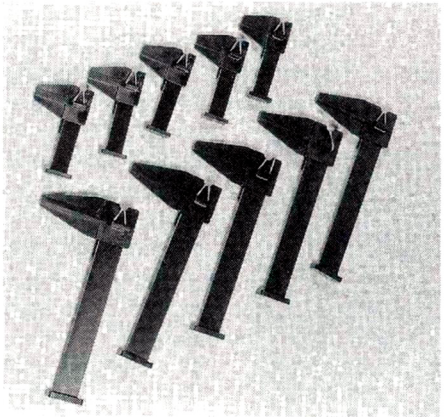
Stay-Brite® Solder Kit; $8.25 retail.

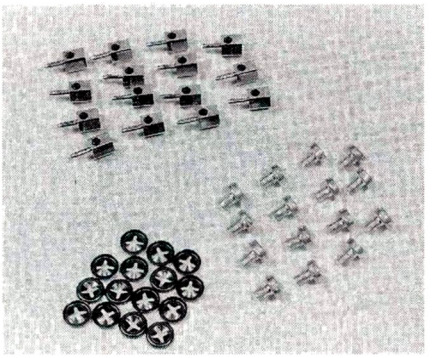
Don't trust your model's life to questionable solder joints, especially those involving your control rods. This kit contains a coil of solder with a high silver content and a bottle of Stay-Clean liquid flux, which together form bright, strong connections with stainless steel, nickel, copper, brass and other metals. Non-toxic Stay-Brite® is five times stronger than ordinary solders; it's very ductile and has excellent elongation and vibration resistance.

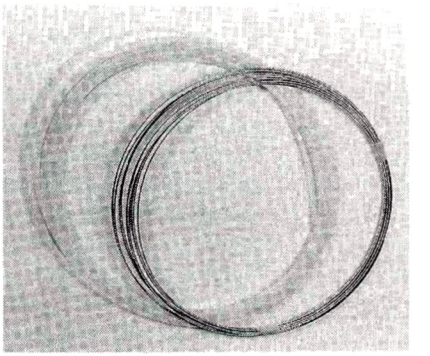


Innovative Model Products Rivet Maker; $16.95.

Rivets make models look so professional and authentic. But if you think writer's cramp was bad in school, just try adding a couple thousand rivets to your next model with a hypodermic needle. There has got to be an easier way. IMP's Rivet Maker kit easily produces realistic ¼- to 1/6-scale rivets with white craft glue and a clear plastic stencil. Make double or single rows of rivets with a simple stroke of your finger. It comes with instructions, two single-row strips, two double-row strips, a rivet bottle and glue.

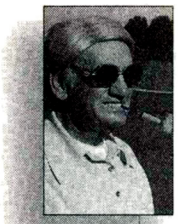






Hobby Lobby Intl., bulk hardware packages; 20-foot; flex-cable pushrod (HLH805)—$5.99; 15 pushrod connectors (HLH809)—$5.99; 10 modeling clamps (HLH827)—$8.99.

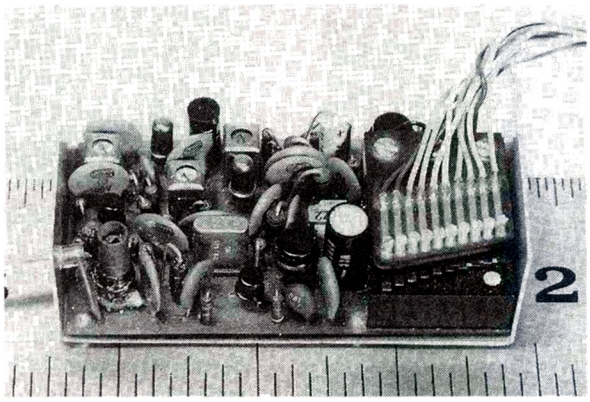
It's Sunday night, and the hobby shops are closed. All you need is one more clevis, lock collar or control horn to finish your model, but your parts box is bare! How annoying is that? Hobby Lobby Intl. has great money-saving bulk hardware packages that will keep your parts bins filled to the rim.



Golden AGE OF R/C

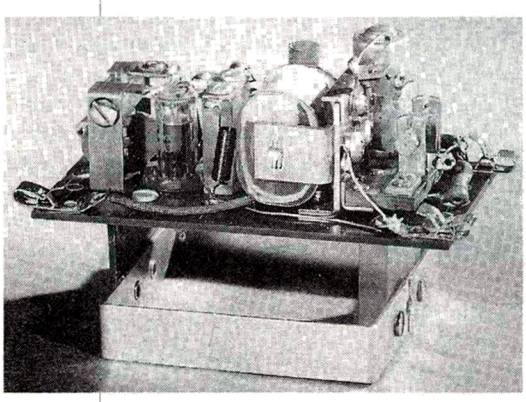
by HAL deBOLT

EARLY RADIO SYSTEMS



A Kraft "relayless superhet" 10-channel receiver.

FROM THE BEGINNING of our hobby, the heart of all R/C systems has been the relay. All the radio broadcasting and receiving was of little effect if the darn relay contacts didn't close to feed needed power to the actuator. In fact, the first R/C relays were worrisome gadgets. You hoped their "Rube Goldberg" construction was practical and that vibration would not doom them. Our need for lightness dictated "minimum" receivers whose minuscule output barely met the relays' requirements. Most of the time, you adjusted these relays with a hope and a prayer. Ed Lorenz took a big step toward alleviating the problem by adding an amplifier stage (Lorenz-Control Research "2-tuber") that raised the relay current to more acceptable levels. Some enterprising R/C'ers used a military-spec Sigma 4F relay—a jewel compared with others. Because it was robust and had positive adjustment features, it could be adapted to R/C needs nicely, but it was large and heavy. At least such systems brought us from single channel to multi.



The C-S very reliable 465 receiver and the military-spec Sigma 4F relay (right) that contributed to outstanding performance.

When Ed Rockwood and, later, Frank Schmidt brought us the first "reed systems," the Sigmas were a bit much for more than two channels. Ed and Frank saw the opportunity for multi-channels; imagine full controls à la full scale! In those days, the need for miniaturization was apparent, and that led to the development of various reliable miniature relays. Another plus was that the superhet reed receivers provided the needed relay current, which allowed practical reed systems. Companies such as Bramco, Orbit and Kraft soon offered up to 12-channel reed systems, and eight were soon the norm. Today, you just throw two switches, often at the flight line, check the controls, and off you go. Not so with reeds! Take 8-channel reeds as an example: if just one servo was to operate, 10 separate contacts had to open or close properly. For the entire system, 40 contacts had to be faultless! To fly reliably, after you had performed the usual tuning and checked that the dry batteries were fresh, you had to examine and adjust all 40 contacts to be sure they would operate correctly. Today, it's amazing that most of us were able to comprehend such a system and, for the most part, fly reliably!

"RELAYLESS" REEDS?

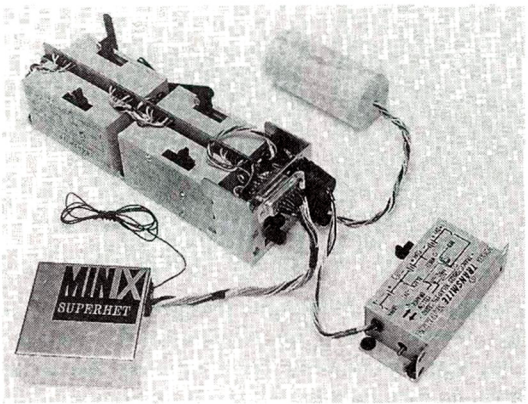
Martin Matthews of Boulder City, NV, sent a copy of a 1962 article by Bob Elliott of E-K Logictrol fame, written while Bob was with Bonner Specialties. The article explains in detail the development of "relayless reed systems." The name is a bit deceiving, because not only were the relays eliminated, but also much of the work was transferred to the servos. The new servos featured what we now know as "amplifiers," which turned the motor on and off.

In effect, all the receiver now did was accept the modulated carrier frequency and pass it to the reed bank. The reed bank decoded the signal and sent it to the appropriate servo, whose amplifier provided the motor power and the output direction. Remember, it required "two channels," two tines and two reeds to operate one servo and control surface.

The result was increased reliability and reduced maintenance because the system went from 40 contacts to just eight (two limit switches remained in each servo). Overall, the system became lighter—a great step forward!

Note that Bob Elliott's article was published in 1962, but Bob Dunham and Ed Kazmirski used "relayless Orbit" systems in the 1960 World Champs, where Ed became the world champion.

Although going "relayless" vastly improved reed systems, progress doomed them. Proportional arrived on the scene and removed all contacts, reduced battery weight and,

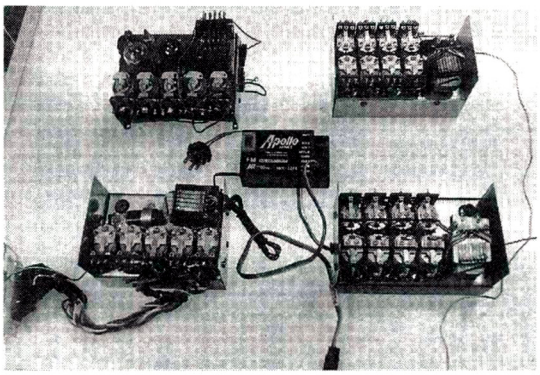


Min-X "relayless" reed receiver with Bonner "relayless" Transmite servos.

above all, allowed realistic control action. Things happened quickly in those days; progress was wonderful. Just look at us now!

AUSSIE MUSEUM NEEDS

Way down in Australia is Bob Mercer, an OT R/C'er, who has developed a fine R/C museum. Bob continues to seek out antique equipment as well as bits and pieces. Bob is often able to supply OT'ers from his museum surplus and hopes that you may be able to help him, too. He is interested in all OT parts, but in particular, he is looking for Bonner Duromite, Transmite and Digimite servos and parts; Orbit 8-channel reed receivers; and C-G 8-channel transmitters. Contact Bob Mercer at 105 Sultana Rd. West, High Wycombe 6057, Perth, W. Australia.



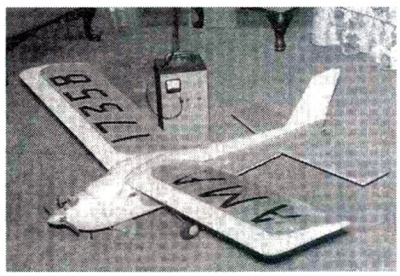
Assorted reed receivers; note the bulkiness of the relays: (left to right) Schmidt, Orbit (top); Orbit, Bramco (bottom); JR Propo (center).

OTHER BITS AND PIECES

Ray Conta of Blasdell, NY, found a 1959 copy of the Flying Bison's "Beep Box" in a dusty drawer. Of interest was an announcement of the annual Mid-Winter R/C Conference, which, at the time, rivaled the Toledo show. This was the second of 15 gala conferences to be hosted by the Flying Bisons. Notables expected to attend included Walt Good, Howard McEntee, Bill Winter, Dick Branstner, Vernon McNabb and Ed Kazmirski.

In contrast to today's trade shows, the Bisons emphasized technical discussions from the experts; the audience discovered what was new in the hobby and also learned that there still was a long way to go! Chuck Hansen chaired the '60 show; he was succeeded by Jim Moynihan. Those were good days!

Robert Charron of Lynn, MA, checked in with memories of his first R/C days. Bob's memory is amazing. He not only remembers flying early R/C with rudimentary equipment, but he also recalls all the details of the tuning, the required voltage and current readings, the three separate batteries and their voltages. As one who was there, I recall what had to be done, but in such detail? No way! He reminded me of the apprehension of flying; like others, he also placed his transmitter conveniently, then ran to it when hand-launching his model; you had to be ready!



Robert Charron's '56 labor of love. Neat! Gyro TX, RK-61 RX and Enya .19 with throttle.

Bob's early exploits included designing and building his own R/C model; on its third or fourth flight, it stalled on the landing approach. The result was a "death dive" that completely destroyed his labor of love! That experience ended his attempts at originality; remember, there were so many time-consuming tasks beyond making a model, and what you really wanted was to fly!

And so it was. Do remember: this is your OT R/C place!

WORLD ENGINES' JOHN AND JACK

Is there an OT'er who does not have fond memories of World Engines? In early times, manufacturers dealt only with legitimate distributors. Then John Maloney of Warren, OH, obtained the U.S. distributorship for SuperTigre engines, and he set up operations in his basement. Later, he also acquired the O.S. distributorship. When John wanted to expand into kit distribution, he found he needed a business facility. So, he took the plunge, hung the World Engines shingle out in Warren, added a variety of stock and grew rapidly. From little acorns ...

With growth, World Engines relocated into its well-known modern facility in Cincinnati. Although the company's basic business was in distributing foreign engines, it soon became an outlet for most major manufacturers. When John discovered he had terminal cancer, he felt it necessary to liquidate World Engines; we then lost a treasured friend.

John Maloney's World Engines logo.

With the advent of R/C, John realized its potential and brought Jack Port into World Engines. Not only was Jack an accomplished electronic engineer but he was also an excellent R/C model designer and flier. These were single-channel days, and with his neat facility at World Engines, Jack developed and marketed R/C systems with innovative features using the "Control Aire" label. Unfortunately, Jack was not with us much beyond the single-channel days. With Jack's passing, Jim Lanterman took over the Control Aire division of WE.

In 1953, the AMA asked me to CD the Nats R/C event. There, we saw the first widespread use of the reed system—progress that generated great anticipation. Jim Walker entered the competition with his sophisticated equipment, but unfortunately, Jim's attempt ended quickly with a "fly away," so the door seemed wide open to someone with reeds.

Experience would be the deciding factor; reeds were new, and single channel was at its optimum. As expected, reeds dominated the meet (there was only one R/C class with no restrictions) until the last flight. Scoring gave 36 points for a perfect spot landing. On this last flight, Jack Port scored well with maneuvers with his single-channel "Hi-IQ" and set up for the landing.

Because he had experience, he was able to set his model in the center of the spot circle; those 36 points won the '53 Nats for him. Well done!

John and Jack are typical of the people who created our OT'er heritage. They are missed!

Pilot PROJECTS

A LOOK AT WHAT OUR READERS ARE DOING

SEND IN YOUR SNAPSHOTS

Model Airplane News is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable. We receive so many photographs that we are unable to return them.

All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of 1996. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

Send those pictures to: Pilot Projects, Model Airplane News, 100 East Ridge, Ridgefield CT 06877-4606.

WAGSTAFF EXTRA

Rick Arrowood and his 14-year-old son, Daniel, of Troy, OH, built this Midwest Extra 300S. They finished it in the BF Goodrich–Patty Wagstaff colors. The father-and-son building team displayed the model at the '96 Dayton Airshow and had special flightline privileges there. Powered by a Moki 1.8, the 15-pound aircraft performed well and impressed all, including Patty Wagstaff, who autographed the wing.

JOLLY ROGER CORSAIR

This Meister-Scale F4U-1A was modeled after one of the VF-17's planes—C.O. "Tommy" Blackburn's Big Hog. John West of Phoenix, AZ, spent one year building the 100-inch-span, 34-pound, fiberglassed balsa-and-ply model. It features a three-piece wing, a sliding canopy and a smoke system, and it's powered by a Quadra 65 engine. John airbrushed the model with acrylic enamel and hand-made all the graphics.

GEE BEE MODEL Y

This Gee Bee Model Y Senior Sportster, assembled according to Henry Haffke plans, is the handiwork of Frank Garrison of Clinton, OH. The 90-inch-span model is covered in Super MonoKote. Frank writes, "I appreciate the dedication of people like Henry Haffke who research history and make possible the return of classics to the air."

LIBERTY BIPE

Aubrey Nabers of Sautee, GA, put together this Liberty Sport in 1995 and has flown it in several fly-ins. Built from Hostetler plans and powered by an O.S. 3.20 4-cylinder engine, Aubrey's creation gets lots of attention. The covering is of Sig Koverall, finished with Sig dope. A custom-made instrument panel, not shown, from Small Aircraft Components rounds out the biplane's scale look.

MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW

Morris Hobbies

JERRY'S BIG BOY

by DAVE BARON

JERRY SMITH HAS designed some of the most successful aircraft in fun-fly competition, and the Big Boy is his first design for the sport and hot-dog market. Morris Hobbies* is the perfect outlet for this design; with its stable of fine models, it has set new standards for aerodynamics and performance.

A hot-doggin' giant-size fun-fly machine!

FIRST IMPRESSIONS

This is a beautiful, complete kit, and it contains hardware that includes clevises for the elevator halves and the rudder. This means that there are six cables going to the tail! The lightweight, aluminum landing gear has tremendous strength and good flex, and it's really good-looking.

The plans and instructions are simple and clear. Any modeler with kit-building experience will enjoy the construction. Because of the square fuselage and constant chord wing, the plane builds very quickly.

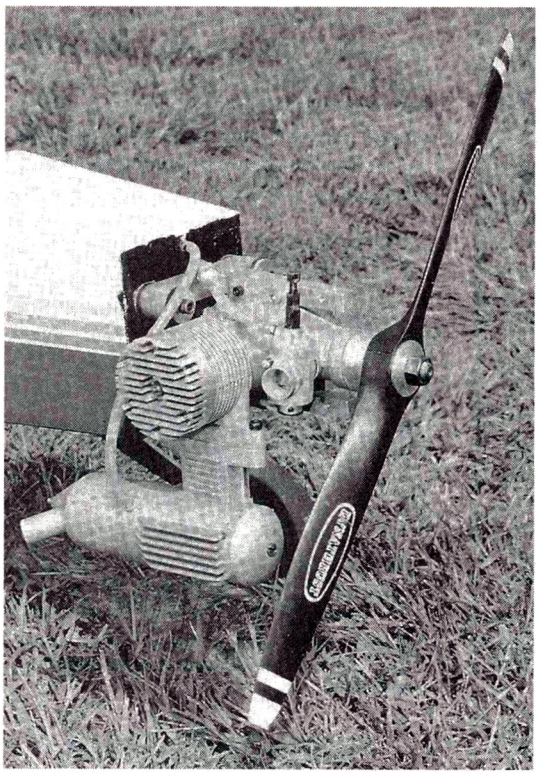
One problem I encountered was with the stick material, which was too soft for areas such as the stabilizer, where the material does double-duty as a "spar" and either the leading or trailing edge. One solution is to add an additional spar in the stab. The stab takes a lot of punishment; if you don't touch down level, its tips can strike the ground before the wingtips. (I realize that all landings are supposed to be perfect, but ...).

Another problem I had consistently was that the plywood landing-gear plate on the bottom of the fuselage de-laminated. The landing gear's length provides tremendous leverage, and the plate should probably be a higher-quality ply. I also recommend that the plate be longer, so that it will distribute load over a greater area on the belly of the plane.

ENGINE INSTALLATION

The Magnum* XL 120 AR certainly belongs in the "powerhouse" list. Every throttle setting above 1/3 on the transmitter stick is straight up. From there on, it's "How fast straight up do you want to go"? The engine's only flaw is that it's very slow to break in. It tends to lean out tremendously in flight. You need to run the engine rich, at about 1/2 turn of the needle for it to settle down in flight. One consolation: even slobbering rich, the plane still goes straight up at 1/3 throttle!

I used Du-Bro's* new vibration-



The author mounted the Magnum 1.20 engine on its side.

isolating mounts to keep some of the big Magnum harmonics out of the fuselage. These mounts are really rugged and simple to install. The benefit of protecting all the servos and other airborne components from the damage of vibration easily outweighs the cost of the mounts.

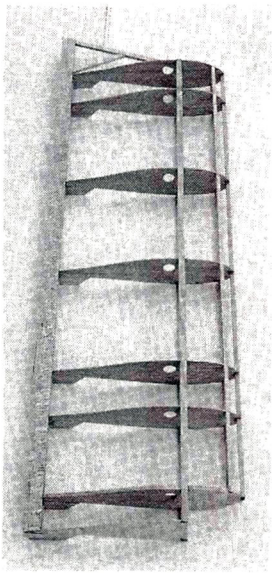
COVERING

To reduce weight and save time, I elected to cover the plane with Top Flite's* Super MonoKote. I also used Top Flite's new polish, and I was really impressed by how much more vibrant the polish made the colors in the finish. It also got rid of every one of the fine scratches left by my iron. It was like waxing your car; the more you rub, the better the looks!

RADIO INSTALLATION

This aircraft requires a radio that you have total faith in. Because of its superb reliability and for all the great fun-fly features the programming system offers, I chose the Airtronics* Stylus. I used Airtronics' contest 4735 high-torque servos, which are labeled "helicopter servos" (this explains why the plane hovers so well!). For the sake of control redundancy, power and minimum slop, the servos were mounted in configurations in which I could have one servo for each control surface on the tail. This provides one servo for each half of the elevator, and one for the rudder. I plugged the two elevator servos into separate ports in the receiver. By doing this, I'm able to mix the two channels so that they will work off the elevator stick and, at the same time, I can adjust the throw limits and trim the centers independently. This is a big advantage over the use of a Y-harness. Later, I tried Airtronics' new "Extended Feature" card system and took advantage of features in the AERO card, such as "ailevator" (sometimes referred to as "taileron"). With this activated, you have mixed the aileron commands into each half of the elevator.

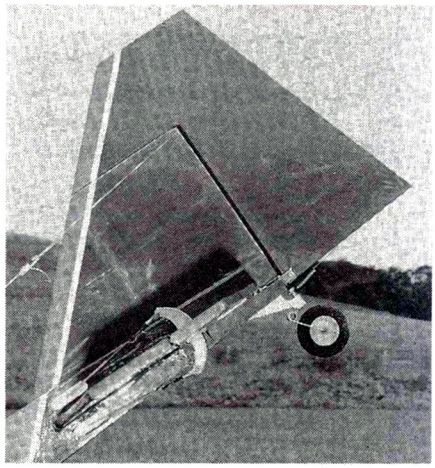
The wing has an even more intriguing system—one that is being seen more often on monster planes—the coupling of servos to the same control surface. There are two servos for each aileron: one at the root, and one on the tip. The servos must be coupled with a Y-harness; use great care to ensure that the throws and geometry are identical on each connected-together servo in the Y-harness. This care must extend to the selection of identical control horns, the use of the same-size output arm on each servo and the use of the same hole in each output arm.



Simple, light and strong are the trademarks of Jerry Smith designs.

My next experiment may be to cut each aileron in half so that I can independently manipulate the surfaces as "inboard" and "outboard" ailerons. With this, you could create crow-type speed brakes by splitting the direction of surface movement on only one side of the plane! Wouldn't the plane flat spin like it was in a cyclone or what?!

All the control surfaces have to be slop-free before you consider flying. The aileron pushrods must be



A clear view of the pull/pull linkages where they connect to the tail surfaces. The control horn is made out of two Robart control horns mounted back to back.

SPECIFICATIONS

Model: Jerry's Big Boy

Manufacturer: Morris Hobbies

Type: IMAA-legal sport/hot-dog

List price: $149.95

Wingspan: 80 in.

Length: 68 in.

Weight: 9.6 lb.

Wing area: 1,360 sq. in.

Wing loading: 16 oz. per sq. ft.

Engine req'd: .60ci to 1.20ci

Engine used: Magnum 1.20 2-stroke

Props used: Dynathrust 15x8 or 16x6

No. of channels req'd: 4 to 8, at least 8 servos—ailerons (4), rudder (1), elevator (2) and throttle (1).

Features: balsa and plywood construction; complete hardware package; simple, clear instructions; square fuselage and a constant-chord wing.

Comments: you'll be amazed at how this model tracks when it's trimmed. At any speed and throttle setting that sustains flight, it will go where it's pointed (to the limit of your radio's range). This type of stability sets it apart. I don't want to fly my other planes anymore!

Hits

- Outrageous maneuverability.
- Great stability throughout its wide speed range.
- All hardware included.
- Simple, clear instructions.

Misses

- The stick material was too soft for areas such as the stabilizer.
- The plywood landing-gear plate de-laminated.

FLIGHT PERFORMANCE

This plane is for fliers: sport fliers, pattern fliers, scale fliers and, especially, big-bird fliers. The Big Boy effortlessly performs all maneuvers in "the book" (and so much more that we'll probably need a sequel to "the book"!). It is smooth, agile and it tracks like a train. Its greatest attribute is that its stability is apparent throughout its wide speed range. Whether you're at idle or full throttle, this is one plane that goes only where it's pointed until it stalls (at an incredibly slow speed!).

• Takeoff and Landing

On many occasions, I have taken off with the throttle at only high trim. The plane will not only fly endlessly at high trim, but it is impossible to land if you don't have a low enough idle! Part of the reason for this is that because of the excess power combined with a minimum of propeller clearance, I needed to use high-pitch props. A high-pitch prop creates two effects that act on your plane as it idles. One effect is that the prop will generate a lot more thrust than you are expecting, and you will have to work to achieve an extremely low idle. Without a low idle, your plane will never stop taxiing or stop flying! The other effect is that the prop will produce no drag when landing. This drag can be an asset if your runway is tight.

The Big Boy's main gear is in just the right place relative to the CG and the center of lift. It is not squirrelly at any throttle setting. Because the plane will simply start to fly at any opportunity, the only caution is the speed at which you taxi, especially into the wind.

This plane literally "leaps" into the air in a conventional, full-throttle takeoff. Although mine is a bit over-powered by the Magnum 1.20, I think that any engine from a .60 up should cause a reaction similar to a rapid reversal of Newton's gravitational laws. If, when you start the takeoff run, you don't have to clear a 50-foot obstacle 10 feet in front of you, you may be inclined to take off at a reduced throttle setting.

When you have the control throws at a reasonable level, the Big Boy flys like a trainer and it will land itself if given half a chance. It has such a wide speed range that you can draw out your flare until you achieve just the right nose-up descent angle and drop into a perfect three-point stance. Wheel landings are a bit more of a challenge only because of the plane's eagerness to fly. Either way it's pure pleasure!

• High-speed flight

This model has shown no signs of flutter at full throttle with a Magnum 1.20 2-stroke. This satisfies *all* my concerns. Always follow the manufacturer's requirements for high-torque servos on every control surface. To fly safely, all giant (80-inch-span or larger) models need more torque than standard servos can deliver.

• Low-speed flight

What is low-speed flight? This plane can hover until it runs out of fuel. If hovering represents zero airspeed, how fast is it *not* going when you hover backward? Hovering is not difficult, but you need to understand the change that the plane—and your control inputs—go through as you transition to hover (see "Learning to 'Hover'" sidebar).

• Aerobatics

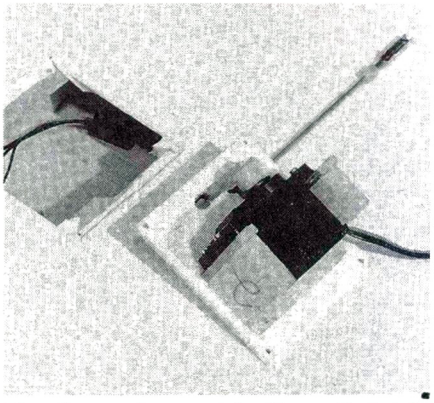
—**Loops.** Jerry L. Smith incorporated into this plane the same airfoil that he uses in his competition fun-fly designs. The result is a loop that is fast and tight at full throttle. Consecutive loops are fun because of how little altitude is lost with each revolution!

—**Rolls.** You can build the ailerons in the kit to be 4 or 5 inches in chord. The larger ailerons have more clout, but they also have a drag penalty. As your plane starts to pinwheel, you'll immediately notice a loss of speed. Even at full throttle, you are inducing a lot of drag. I went with the 4-inch ailerons and found that they are perfect for all sport maneuvers and hovering. The day that I hear about the first giant fun-fly competition, I'll wish that I had the bigger ailerons!

—**Lollipops.** I have enjoyed this maneuver since I started enjoying fun-fly airplanes. You need to have enough power to accelerate vertically. For this, you must first hover; then you hit the throttle and immediately continue straight up. At the moment of your plane's peak vertical acceleration (not speed), kick in full rudder and keep the plane flat with the ailerons and elevator as it rotates. Done correctly, this part of the maneuver will look like the tightest knife-edge loop you have ever seen! As the plane comes back around to the vertical, throttle back to hover and neutralize the rudder to finish the maneuver.

Perhaps the greatest pleasure in a plane such as this is that it tempts you to explore its outrageous maneuverability. You'll come up with maneuvers that have yet to be explained. Sometimes, the hardest part is figuring out what you did so that you can do it again!

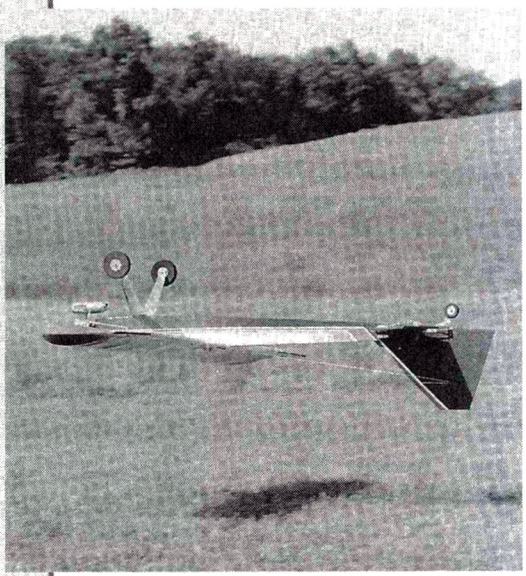
tested for bowing and flexing and have heavy-duty linkages. Make sure all the rods are perfectly straight. For the rudder and elevator, the pull/pull system is almost always slop-free, but it should be checked for expansion and contraction on excessively hot or cold days.



The aileron servo mount doubles as the hatch cover. This saves weight and makes maintenance easy.

BATTERY CONFIGURATION AND CAPACITY

Make sure you use at least a 1200mAh airborne pack. I like 5-cell (6V) packs in environments where the leads are long and maximum servo power is a consideration. This becomes important in maneuvers that put a lot of load on the servos. The current drain caused by a fully stalled servo can rise above ½ amp per servo in high-G maneuvers. Rolls at full throttle could produce as much as a 2A load if you have extra-large control throws. I am always comforted by a bit of power reserve in the battery department!



The flight characteristics of this model may make you try things you wouldn't ordinarily do.

LEARNING TO "HOVER"

• **Up and down.** The throttle still controls altitude. While the plane hovers, the throttle becomes a bit more critical. Learning to hover will give you a new respect for the talent in your left thumb!

• **Fore and aft, left and right.** The elevator becomes the fore and aft control, but as you look up at your plane, the elevator has the most natural feel, and you will need to adjust only to the new sensitivity of the controls. If you want to think of your plane as a helicopter, the elevator and rudder become the cyclic control. Note that the ailerons are no longer the model's primary method of movement right and left as it relates to your position. This control changes from the ailerons while in forward flight to the rudder while in hover. The rudder becomes the most difficult command to master because its control surface is the smallest, and most modelers have yet to master the use of the rudder in flight. It will take you a while to sort out whether the command the plane needs is a rudder command or an aileron command. You won't be an expert at hovering until these corrections are instinctive, and all you're thinking about is where you want your hovering plane to go!

• **Yaw.** In a hover, this is controlled by the ailerons. You'll be surprised at how much constant right aileron you'll have to hold to counteract the torque and spiraling slipstream of the engine and prop. This will become second nature in time; but again, you'll need to adjust your own reaction time and become familiar with the reaction time of the controls in a given situation.

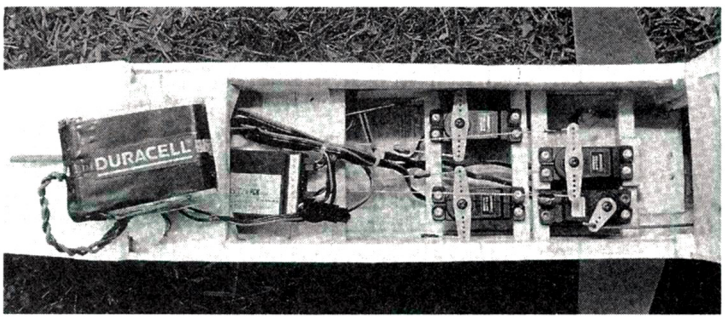
• **Other pointers**. When the airplane is hanging on its prop, the thrust generated by the prop is the only airflow that the controls have to deflect. If you get into trouble and the plane starts to fall to one side or the other, you probably have about 15 degrees of departure from the vertical (hovering position) before you lose hover control and the plane starts to transition back into horizontal flight. When you think you are going to lose control, add throttle. This immediately increases the airflow over the control surfaces and buys time and precious altitude while you get things sorted out!

Do you fly helicopters? This is not the same as a helicopter, because a typical heli-control configuration mixes the cyclic controls in the right stick and the throttle/collective and yaw on the left stick. Your hovering plane has the left and right yaw (rotation) on the right stick and the left- and right-direction control on the left stick. This is harder to unlearn than you would expect. Fortunately, the transition out of hover and back into forward flight is easy if you get into trouble.

DANGER: the worst thing that can happen is if the engine quits as your plane hovers at low altitude. Your model will either tailslide into the ground and break all kinds of things that you have never seen broken before or it will pitch over and slam gracelessly onto its nose. It takes 40 feet to recover from this disaster, so practice at least one mistake high.

Don't hover your plane if the engine is:

• low on fuel;
• running lean or hot;
• not broken-in;
• running at less than peak performance.



To keep the receiver accessible, I made a shelf ahead of the wing mounts and above the pull/pull lines. The rudder servo mount is elevated so that its linkage runs clear of the elevator lines.

CONCLUSION

Without a doubt, this aircraft is the most fun I have ever had with a giant model. I recently took it to a giant rally, where no one expects to see hot-dogging. Needless to say, everyone who saw it wanted to know what it was and where to get one! Hats off to Morris Hobbies and Jerry Smith for producing this outstanding plane.

**Addresses are listed alphabetically in the Index of Manufacturers on page 151.*

MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW

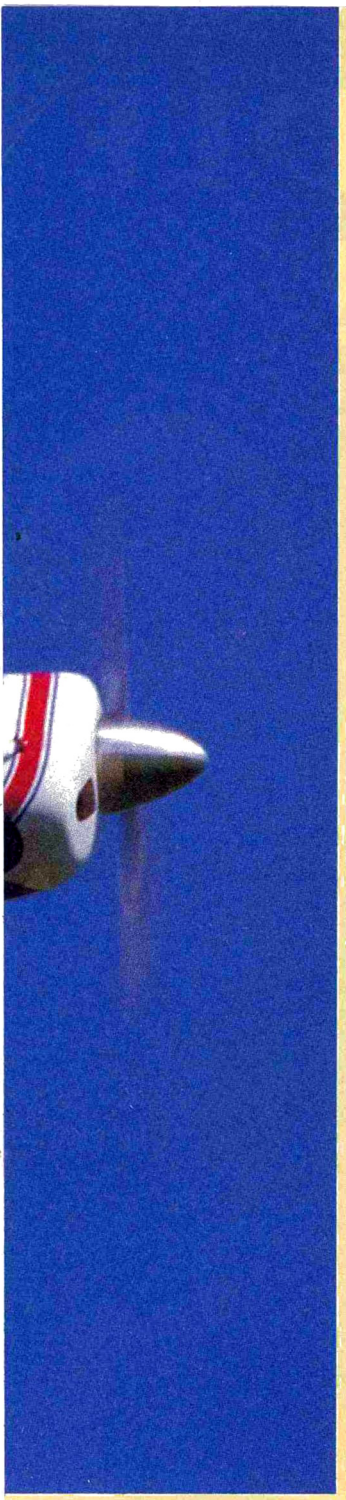
The latest, greatest Pitts Special—IMAA legal

MIDWEST PRODUCTS CO.

Super Stin

by JIM ONORATO

CURTIS PITTS has been crafting some of the world's finest full-scale acrobatic biplanes for 50 years, and his latest creation, the Super Stinker 11-260, may be his best. More than just being able to compete with more exotic unlimited aerobatic monoplanes, the Super Stinker continues the Pitts tradition of winning. Now Midwest has captured the essence of Pitts' genius with an IMAA- and IMAC-legal, 27-percent-scale version of this super-bipe. The Super Stinker is part of Midwest's Success Series of kits, which include several excellent flying warbirds, trainers and aerobatic monoplanes.*



PHOTOS BY WALTER SIDAS & JIM ONORATO

ker

SPECIFICATIONS

Name: Super Stinker 11-260 (kit no. 182)

Manufacturer: Midwest Products

Type: aerobatic scale biplane

Wingspan: top—60 in., bottom—58½ in.

Wing area: 1,240 sq. in.

Airfoil: symmetrical

Weight: 13 lb., 7 oz.

Wing loading: 25 oz. per sq. ft.

Length: 59 in.

Radio: 7 channels, 8 servos—rudder (1), ailerons (4), throttle (1), elevator (2)

Engine req'd: 1.08-1.80 2-stroke or 1.5-3.0 4-stroke

Engine used: Moki 1.80 2-stroke

List price: $374.95

Features: the fuselage is constructed from die-cut, lock-together plywood and balsa. The tail feathers and wings are conventional, built-up balsa construction. The wings have a symmetrical airfoil and four "barn-door" ailerons. A pre-shaped cabane block and a through-the-top top-wing attachment make wing installation simple. Self-aligning, pre-bent aluminum cabane struts ensure proper wing alignment. The kit also includes a complete hardware package. Additional items include: a vacuum-formed canopy, pre-trimmed ABS cowl and wheel pants, self-stick decals, a fully illustrated construction manual and three sheets of full-size rolled plans.

Comments: the Super Stinker is a high-quality, easy-to-build kit that looks great on the ground or in the air. Its aerobatic performance should satisfy even the most demanding pilot.

Hits

- High-quality materials and die-cutting.
- Fully illustrated, step-by-step instruction manual.
- Excellent flight performance.
- Computer radio "tweaks" from designer Mike McConville.

Misses

- Wingtip and aileron-tip designs.

THE KIT

The Super Stinker features jig-lock construction, lite-ply and balsa die-cut parts and a complete hardware package. The illustrated construction manual also contains some of designer Mike McConville's tips for maximum performance, including computer radio tweaks that will enable you to get the most out of this high-performance aerobatic biplane.

The illustrated construction manual also contains some of designer Mike McConville's tips for maximum performance, including computer radio tweaks that will enable you to get the most out of this high-performance aerobatic biplane.

CONSTRUCTION

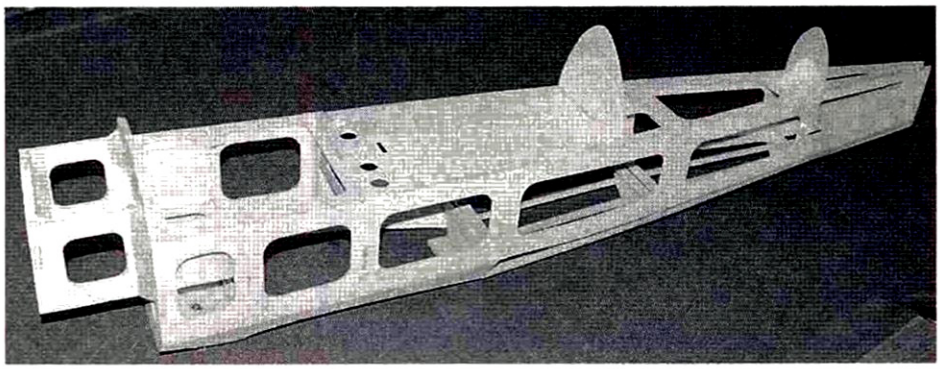
I used Balsa USA* thin CA and gap-filling CA for most of the balsa construction, and Great Planes* epoxy on the plywood. Construction began with the tail feathers, which were quite straightforward. The stab and fin are built up with ¼-inch stripwood and die-cut parts, then sheeted with 1/16-inch balsa. The elevators and rudder are fabricated with ⅜-inch stock and are not sheeted. The die-cut pieces are ⅛-inch thick, and two or three are laminated to match the thickness of the frameworks.

The fuselage is built from interlocking die-cut parts (mostly lite-ply) that self-align during construction. Because the parts interlock, it is important that you follow the construction sequence given in the instructions. The lower section of the fuselage is built upside-down over the top view on the plans and then lifted to install the engine box and turtle deck. All the interlocking parts fit perfectly, and the result is a strong, straight structure.

The turtle deck is constructed of 1/32-inch plywood formed over two lite-ply formers. I sprayed the ply with ammonia and water to get it to bend easily. The upper-forward portion of the fuselage is made of ⅛-inch balsa sheeting, and it required a lot of wetting to prevent it from cracking. The landing gear is made of two pieces of preformed aluminum, which are attached to the fuse with four concealed bolts and blind nuts. The cabane struts are also preformed aluminum and are attached to pre-drilled plywood cabane mounts to ensure the proper incidence of the top wing.

This neat design makes a normally difficult task very easy.

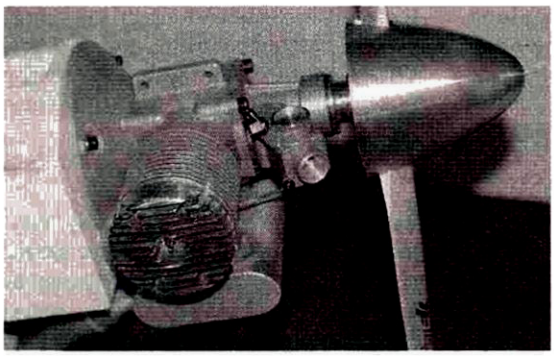
The cowl and wheel pants are made of pre-trimmed ABS plastic, which eliminates tedious trimming and fitting. They just need to be glued together with PVC cement and reinforced with fiberglass tape. Midwest recommends that you fiberglass the inside of the cowl to add rigidity. Although, the parts in my kit were not the least bit flimsy and would have been completely adequate; I decided to use Aeroglass* fiberglass wheel pants and cowl, which fit the Stinker perfectly.



The partially assembled fuselage structure. The fit of the parts is very good and it goes together quickly.

WINGS

The wing panels are built directly over the plans. The top wing is built upside-down in one piece. The bottom wing panels are built right-side up in two pieces, then joined. There's nothing particularly difficult about building the wings, but you want to follow the instructions carefully and check off the steps as you proceed so you don't install something upside-down. The two wings are similar in construction, with the main difference being in the center sections.

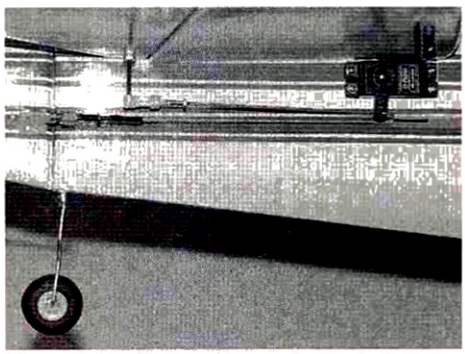


The Moki 1.8 2-stroke glow engine and Bisson muffler fit nicely on the firewall.*

I didn't like the wingtip and aileron-tip design. The tips are built up on a die-cut piece of lite-ply that tends to be a little flimsy. Once the ailerons are cut off the wing, it's difficult to keep the aileron's trailing edge straight at the tip. The only modification I made to the wings was to add 1/4-inch-square balsa back-up pieces where the aileron hinges were installed. The top wing is attached with a pre-shaped cabane block, which is permanently attached to the cabane struts. The wing is then bolted to the cabane block from the top with two 1/4-20 bolts. The cabane block automatically sets the correct incidence of the top wing. I liked this design feature. The interplane struts, which are made of die-cut lite-ply reinforced with 1/8x1/4-inch spruce spars and balsa doublers, are attached to the wings with 4-40 capscrews and blind nuts.

RADIO AND ENGINE

I used eight standard-size servos in the Stinker: four for the ailerons, two for the



The completed tail section shows the installation of the elevator servo mounted below the stab.

FLIGHT PERFORMANCE

Because the Super Stinker is a high-performance, acrobatic bipe, I set the control throws to about half of what was suggested for "low" rate.

• Takeoff and landing

The Super Stinker handled very well on the ground. Tracking on takeoff was good, and only a slight amount of right rudder was required to keep it going straight. Flying speed was achieved quickly at half throttle, and a gentle pull on the elevator was all that was necessary to get the plane airborne. It climbed out nicely with the wings perfectly level. Landings were just as easy. The Super Stinker was slowed way down for landing and flared just before touchdown for a beautiful three-point landing.

• Low-speed performance

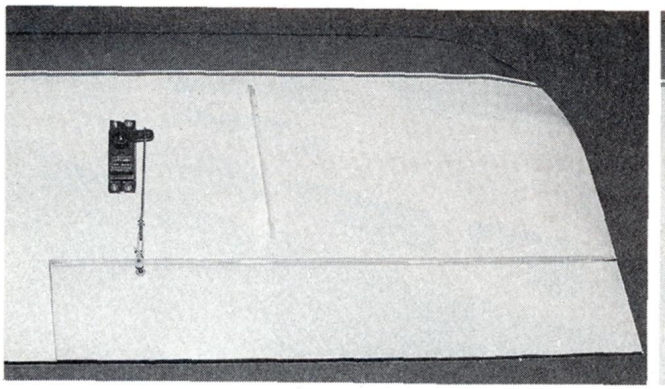
The Super Stinker is smooth and predictable at low speed. It has a very low stall speed, and its stalls are gentle and straight ahead. Control response was good at all speeds.

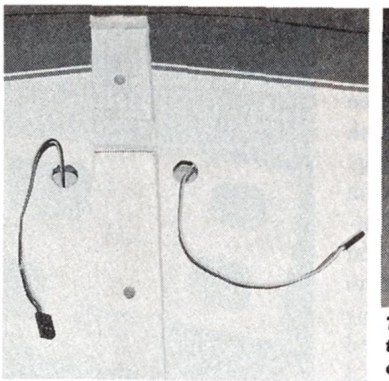
• High-speed performance

At high speed, the Super Stinker is a go-where-you-point-it airplane. It tracks extremely well and is a smooth and stable flier. Because of the size and effectiveness of the control surfaces, Midwest recommends the use of exponential to soften the feel around neutral. They also recommend that you do not perform prolonged full-throttle dives, as control-surface flutter could result. The Moki 1.8 is a very powerful engine and provided unlimited vertical performance. Midwest says that the Stinker will also perform well with a good 1.20.

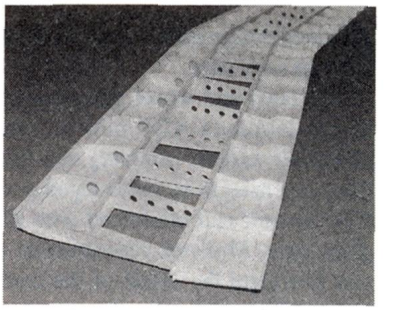
• Aerobatics

The instruction manual states, "The Super Stinker is a high-performance model that is capable of performing any maneuver imaginable." Frankly, I believe it! The recommended control throws are large and make for some pretty violent aerobatics, so take it easy on your initial flights. The Super Stinker flies as well inverted as right-side up with very little down-elevator. At high rates, the Super Stinker does split second axial and snap rolls. As is typical with most biplanes, the Super Stinker has a tendency to pitch and roll when coupled with the application of rudder. However, the instruction manual contains some excellent notes on how to correct these tendencies with a computer radio. The notes also explain how to perform such maneuvers as the Lomcevak, torque rolls, inverted flat spins and the knife-edge slip. I haven't tried the last two, but I intend to!



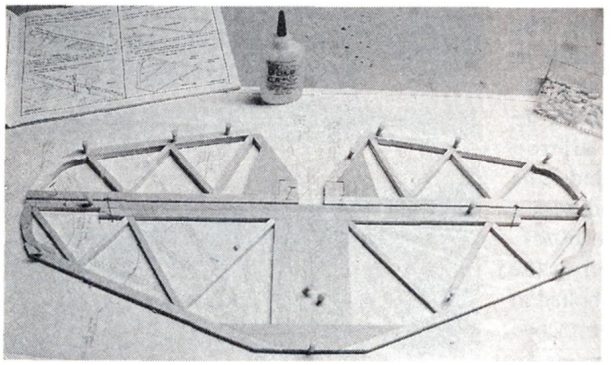


Left: each aileron (there are four) has its own direct-control servo mounted in the wing. Right: the top wing's center-section shows the cabane mount and the servo leads.



The wing assembly during construction shows the lightening holes in each of the ribs.

elevators, one for the rudder and one for the throttle. The two elevator servos (one of which had to be reversed) were installed in the rear of the fuselage. I installed the rudder servo—with a pull/pull setup—under the canopy. I placed the aileron servos in the wings, just in front of the ailerons. In order to avoid plugging all four aileron servos into one channel, I connected the two left aileron servos with a Y-harness (which I plugged into channel one), and connected the two right aileron servos with another Y-harness (which I plugged into channel six.) These two channels were then mixed using the flaperon function on the transmitter. The Stinker was powered by a Moki* 1.80 fitted with a Pitts-style Bisson muffler and an 18x8 Top Flite* Power Point propeller. A 3½-inch aluminum Tru-Turn* spinner completed the power package.



The easy-to-build tail parts are built directly over the plans.

FINISHING

The color scheme on the *Super Stinker* is fairly elaborate, but the plans have a covering outline that is very helpful. For the covering, I used Coverite's* 21st Century light red, mid. blue and white fabrics. I prefer this material for planes with multiple colors because you can put one color over another without worrying about air bubbles. I used Great Planes blue Kwik Stripe and Goldberg's* red striping tape on the fuse and wings. The design on the wheel pants was done with red MonoKote* trim and blue Coverite pinstripes, which I sealed with polyurethane. To add a little pizazz to the Stinker, I used Midwest's optional, detailed instrument panel. I also used a Williams Bros.* pilot figure and a headset that I fashioned out of wire and faucet washers.

CONCLUSION

The Super Stinker is a high-quality, easy-to-build kit that looks great on the ground or in the air. It is a high-performance biplane that is capable of every maneuver in the book (and then some!). Its aerobatic performance should satisfy even the most demanding pilot. If you love biplanes, as I do, you'll enjoy building and flying Midwest's Super Stinker.

**Addresses are listed alphabetically in the Index of Manufacturers on page 151.*

MODEL AIRPLANE NEWS

ENGINE REVIEW

SuperTigre G90

A lightweight torque machine

by MIKE BILLINTON

HAVING successfully "stretched" their .61ci 2-stroke to a .75, SuperTigre* has now boldly used the same crankcase for this .90-size middle-of-the-range sports engine—the G90.

What are the ramifications of "boring and stroking" a given engine size? Commercially, it makes sense: this is a "new" engine at minimal cost; it fits existing structures; and spares are readily available.

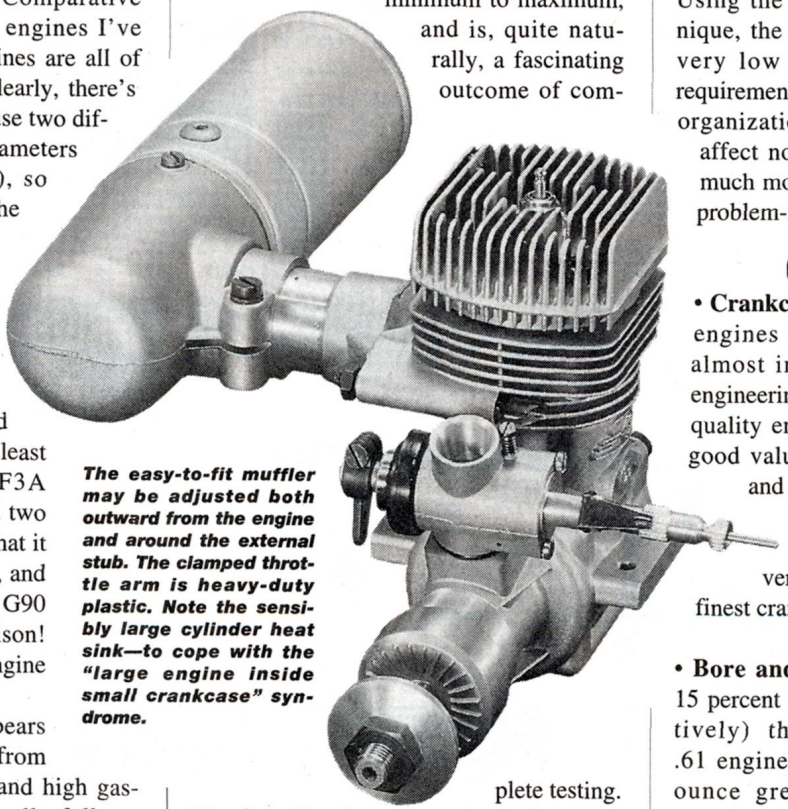
TORQUE TALK

Looking at torque figures is just one way of comparing engines. The G90's torque at lower rpm is good—so good that this apparently "normal sports engine" is in the number-two place in my "Comparative Torque" list of the top 12 engines I've tested. These illustrious engines are all of medium to large capacity; clearly, there's a scale effect at work. But I use two differently directed torque parameters (oz.-in./lb. and oz.-in./cc), so many engines don't make the list—none of the top R/C car or marine engines, for example. The list highlights only reasonably light aircraft engines that have higher than average cylinder pressures (good bmep figures). It includes at least two International Class F3A engines (R/C aerobatics) and two ducted fans. The surprise is that it includes three sports engines, and a greater surprise is that the G90 fares so well in the comparison! Maybe there's a new F3A engine here?!

Technically, the G90 appears to benefit more than usual from its narrow transfer passage and high gas-transfer velocity (which usually follows from boring out a given crankcase); this favors low-rpm operation. Those who worry about airplane noise and the associated problem of flying-field retention might be pleased with the figures in the torque chart. The higher these figures are for any given engine, the more amenable it will be to stringent silencing measures—without an undue loss of power.

Engine testers are often criticized because they use horsepower figures instead of just torque—and these are open-exhaust figures anyway. I find torque the most interesting aspect of engine performance. This fundamental force is the effort imparted, for example, to the crankshaft of an internal-combustion engine by the piston's reciprocating motion. At any time, it's really the only thing the engine is producing. Horsepower merely includes the dimension of time: the more close together those individual torque impulses occur, the more horsepower the engine is making available.

It's interesting to observe the way in which torque "unfolds" as rpm ranges from minimum to maximum, and is, quite naturally, a fascinating outcome of complete testing. The fact then: horsepower reporting itself is solely a mathematical summation of that varied torque release against time. Maybe it would help if the torque curve were placed more prominently at the top of the normal results graph and the rather more misleading hp curve made to skulk at the bottom for a change! (Any comments?)



The easy-to-fit muffler may be adjusted both outward from the engine and around the external stub. The clamped throttle arm is heavy-duty plastic. Note the sensibly large cylinder heat sink—to cope with the "large engine inside small crankcase" syndrome.

Admittedly, reporting open-exhaust figures is more contentious because of the wide range of available mufflers. And manufacturers might be inclined to supply reviewers with less restrictive mufflers to keep their engines' hp figures looking more favorable. Like their customers, they still see horsepower figures as more meaningful.

Open-exhaust performance figures allow us to compare engines scientifically. Noise-restriction rules are for national and international bodies to agree on and enforce rather than for individual (maybe biased) engine testers to influence. I'm happy to test engines and report any significant moves in this area—and other technical advances (even those that aren't noise-friendly).

The results of the FAI's imposing sound-level regulations on the competition in the F3A class have been interesting. Using the appropriate tuned-pipe technique, the new Webra 120 operates at a very low 7,000rpm to meet the FAI requirements (test imminent). This type of organization-led development will also affect normal sports-model setups, but much more needs to be done to ensure a problem-free future.

G90 MECHANICALS

• **Crankcase.** Over the years, SuperTigre engines have developed steadily but almost inconspicuously. Very sound engineering and design have led to high-quality engines that also represent very good value. Their crankcase structures and surface finishes are sound and visually appealing, and the G90's one-piece design is very robust; in fact, it's one of the finest crankcase structures around.

• **Bore and stroke.** Bore and stroke are 15 percent and 13 percent greater (respectively) than those of the standard .61 engine; overall weight is only 0.25 ounce greater, and height has been increased by only 4mm.

• **Crankshaft.** The heat-treated nickel-chrome crankshaft is the other essential that allows power flow to continue unaffected by any distortions or wear.

• **Crankpin and crankweb.** These have been forged to ensure that the metal "grain" flows around the various angles

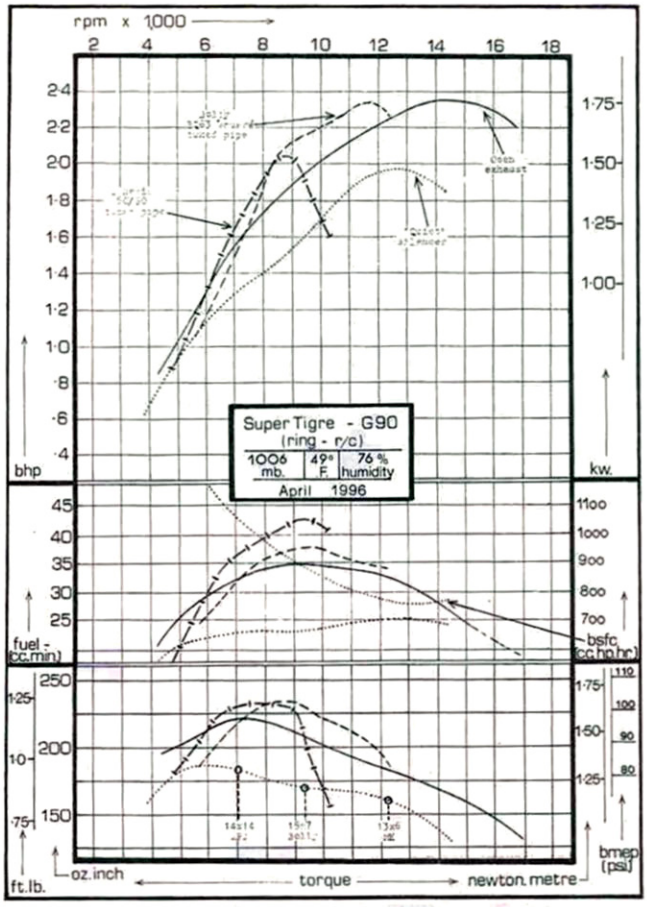
WEIGHTS AND DIMENSIONS

Capacity	0.900458ci (14.756cc)
Bore	1.083 in. (27.52mm)
Stroke	0.9775 in. (24.828mm)
Stroke/bore ratio	0.9026:1
Timing periods	Exhaust—142° Transfer—118° Boost—113° (angled up 50°) Front induction—opens 41° ABDC —Closes 51° ATDC —Total period 190° —Blowdown 12°
Combustion volume	1.6cc
Compression ratios	Geometric—10.22:1 Effective—7.59:1
Exhaust-port height	0.279 in. (7.09mm)
Cylinder-head squish	0.040 in. (1.016mm)
Cylinder-head squish angle	3°
Squish-band width	0.185 in. (4.7mm)
Carburetor bore	0.348 in. (8.85mm)
Crankshaft diameter	0.669 in. (17mm)
Crankshaft bore	0.472 in. (12mm)
Crankpin diameter	0.275 in. (7mm)
Crankshaft nose thread	0.310 in. x 24 TPI (5/16 UNF)
Wristpin diameter	0.275in. (7mm)
Connecting-rod centers	1.73 in. (44mm)
Engine height	4.153 in. (105.5mm)
Width	2.397 in. (60.9mm)
Length (backplate to prop driver)	3.69 in. (93.74mm)
Width between bearers	1.692 in (43mm)
Mounting-hole dimensions	1.968x0.787x0.167 in. (50x20x4.24mm)
Exhaust-manifold bolt spacing	1.85 in. (47mm)
Frontal area (bare)	7.23 sq. in.
—with muffler	11.33 sq. in.
—with tuned pipe	13 sq. in.
Weight (bare)	20 oz. (566gm)
—with quiet muffler	25.9 oz. (734gm)
—with Genesis 60x90 or Bolly EQ63 (tuned and manifold)	28 oz. (794gm)
Crankshaft weight	3.15 oz. (90gm)
Piston weight	0.50 oz. (14gm)

PERFORMANCE

Max. b.hp 2.35 @ 14,418rpm (open exhaust/5% nitro)
2.34 @ 11,670rpm (Bolly pipe @ 480mm/5% nitro)
2.03 @ 8,891rpm (Genesis pipe @ 510mm/5% nitro)
1.97 @ 12,768rpm (SuperTigre Quiet muffler/5% nitro)

Max. torque 231 @ 7,813rpm (Genesis pipe @ 510mm)
229 @ 9,000rpm (Bolly pipe @ 480mm)
220 @ 7,300rpm (open exhaust)
186 @ 5,923rpm (SuperTigre quiet muffler)



RPM ON STANDARD PROPELLERS

	Open exhaust	ST Quiet muffler	Genesis pipe @ 510mm	Bolly pipe @ 480mm
18x7 Mastro	6,160	5,605	–	–
14x14 APC	7,865	7,060	7,960	7,820
16x6 Merati	8,360	7,600	8,640	–
15x8 Graupner	9,060	8,360	–	–
16x6 Airflow	9,230	8,540	9,100	9,460
15x8 APC	9,440	8,640	–	–
16x5 Zinger	9,680	8,940	–	–
13x10.5 MK	9,900	9,080	–	–
15x7 Bolly	–	9,290	–	10,291
15x6 Airflow	10,140	9,370	9,600	–
14x7 Graupner	10,220	9,580	–	–
12x12 APC	10,550	9,790	9,740	10,930
13x6 MK	12,770	12,250	11,200	12,430
12x6 Mastro	13,140	12,550	–	–
10.5x8 Bolly	–	14,760	–	–
11x7 APC	14,960	14,180	–	–
10x6 MK	15,080	–	–	–
PERFORMANCE EQUIVALENTS				
B.hp/ci	2.61	2.19	2.25	2.60
B.hp/cc	0.159	0.133	0.14	0.158
B.hp/lb.	1.88	1.22	1.16	1.34
B.hp/kilo	4.15	2.68	2.55	2.95
B.hp/sq.in. frontal area	0.32	0.17	0.156	0.18
Oz.-in./ci	244.30	206.60	256.50	254.30
Oz.-in./cc	14.90	12.60	15.60	15.50
Oz.-in./lb.	176	114.90	132	130.80
Ft.-lb./ci	1.27	1.07	1.34	1.32
Nm./cc	0.106	0.09	0.112	0.111

Manufacturer: SuperTigre, Bologna, Italy.
Distributor: Great Planes Model Distributors, P.O. Box 9021, Champaign, IL, 61826-9021.

without interruption—another example of quietly improving engineering without a fanfare. I'm not sure why SuperTigre doesn't boast about this improvement—time to go public maybe? SuperTigre is also one of the rare manufacturers that opt to fine-finish-grind the crank-nose threads (as seen recently in the MDS 46).

• **Piston/liner combination.** This is a single-ring medium, high-silicon piston running with 0.002-inch clearance in a hardened-steel liner. The piston has been externally honed (this is well worth the time it takes because it's essential to true roundness), and the liner has been internally ground to its finished size.

• **Porting.** The liner has the standard Schnuerle transfer and boost ports with restricted port timings that take advantage of the expected low-ish rpm. Externally, the very wide boost passage is of the usual SuperTigre style, yet internally, it's about only half as wide—a strong case!

• **Cylinder head.** This is a one-piece unit with a wide squish band angled at 3 degrees, and the chamber is of the usual "bowler-hat" shape. The brass threaded

Behind this engine lies much steady, long-term development.

glow-plug insert gives long-term reliability to glow-plug fitting.

• **Compression ratio.** This is set at a relatively gentle 7.6:1—a feature that effectively retards ignition points (again indicating the expected low-rpm operation). An operational effect of this lowish ratio is that the glow plug acts colder than it would on other high-compression engines and would thus not easily sustain correct part-throttle running if the fuel setting was too rich. I had to keep the plug lit until the engine reached a leaner fuel setting.

PERFORMANCE

To help readers make their own comparisons, I ran the G90 with a wide range of props.

The piston/liner combo led me to expect a lengthy running-in period, but SuperTigre's precise workmanship allowed a fairly easy transition to full-bore operation after approximately 30 minutes. I used a variety of the listed props—using the short-run technique—and gradually increased load and throttle openings.

■ **Test 1.** *Open exhaust; fuel—5 percent nitro, 10 percent castor, 10 percent ML70 synthetic oil, 1.5 percent ether, and the remainder methanol; glow plug—SuperTigre.*

Following the manufacturer's fuel recommendations, I obtained rpm ranging from a high 16,867 to a sensibly lowest feasible 4,400rpm. The lowish rpm bias in torque (maximizing at 7,300rpm) soon became apparent, though hp was still rising well at 13,000rpm showing that all design features—narrow transfer passages, low port timings and relatively small-bore (8.8mm) carburetor—worked well together in the final analysis.

■ **Test 2.** *SuperTigre "Quiet" muffler; same fuel and plug as in Test 1.*

Subjectively (indoors), I found the effect of this "new-generation" backpressure muffler quite marked. Torque and hp were affected of course , but there was significant gain in fuel economy.

Using the fuel-efficiency parameter of brake-specific fuel consumption in cubic centimeters used in 1 hour if developing 1hp (bsfc), the G90's 755cc and hp are rarely achieved by 2-stroke engines run on methanol. The O.S. 35 BGX and, more recently, the Irvine 150 are equally creditable in this respect.

The dip in torque production as rpm rose was probably caused by the use of this new muffler, but being mild has little practical effect on which rpm to use between the limits 6,000 to 12,000.

• **Sound levels.** Using the ST "Quiet" muffler, this engine certainly meets official requirements. But, as my figures show, this can only be done by restricting the rpm of this large 15cc engine down to 7,000.

■ **Test 3.** *Genesis 60/90 tuned pipe; same fuel and plug as previous tests.*

Provided by Weston Products and recommended by the U.K.'s SuperTigre distributor Mick Wilshere, this "quiet" tuned pipe was fitted uncut at a 500mm length from piston face to first maximum diameter using a standard SuperTigre manifold. I expected it to enhance lowish rpm, so I was not surprised to see that torque was much raised in the 8,000rpm area—way above the muffler levels and somewhat over open-exhaust levels. The quite wide and flexible rpm bandwidth was also shown to favor "sports" users.

I didn't use a range of props wide enough to do the Genesis pipe full justice; of those used, only the 14x14 APC and the 16x6 Airflow would be of use where low rpm are required.

■ **Test 4.** *Bolly EQ63 (square) tuned pipe; same fuel and plug.*

The volumes of both the Bolly and the Genesis pipes are nominally too small for a .90ci engine. This relationship has to take into account the expected rpm levels as well as the simple ratio of cylinder capacity to pipe volume. Clearly, at low rpm, the gas throughput is much reduced and so does not see a small volume pipe as much of a restriction.

At the rear is Bolly's carbon-fiber EQ63 square X-section tuned pipe. The aluminum pipe is Weston U.K.'s Genesis Quiet 60/90 tuned pipe. At the front is SuperTigre's chrome-plated brass exhaust manifold.

To obtain high-rpm data, I deliberately set the Bolly pipe at a shorter effective resonating length than the Genesis (640mm, piston face to internal baffle). A fair comparison of the two would only be possible if both were tested at a range of lengths—and perhaps on a variety of engines! But this would then be a pipe test instead of an engine test! Basically, both pipes should yield the same results. The differences between them shown on the graph result mostly from their different resonant lengths. With the Bolly pipe, the 16x6 Airflow, 15x7 Bolly and, maybe, 12x12 APC props look useful.

COMPARATIVE TORQUE

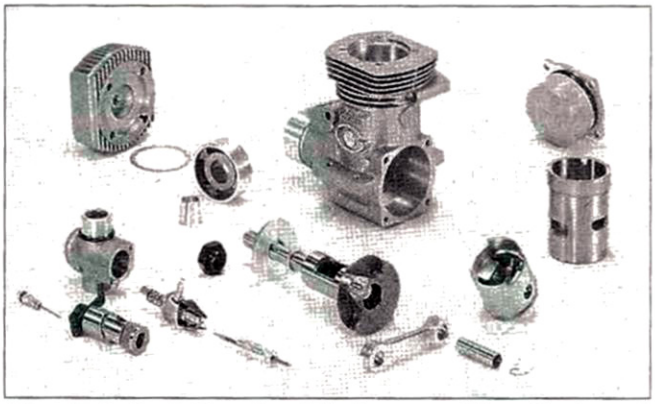
	Disp. (cc)	Units above 130 qualify. oz.-in./lb.	Units above 13 qualify. oz.-in./cc
3W B120 twin(gas/spark)	114	200	14.7
SuperTigre G90	**15**	**176**	**14.9**
Webra Speed 120	20	170	14.0
Moki 180	30	164	14.13
O.S. BGX	35	156	13.0
Webra Speed 50	8.4	146	13.8
SuperTigre G4500	45	147	14.1
Enya 80XF	12.5	142	13.6
Fox Eagle 74	12	140	13.7
OPS 80 fan	13	134	13.8
O.S. 91 fan	15	133	14.2
O.S. 120 s/charged	20	132	15.0

Engine—open exhaust; **fuel**—5% nitro/methanol.

TORQUE FOR SPORT

On the test bench, it has always been apparent that rel-

ative engine performances with a variety of exhaust systems and rpm levels are better illustrated by the torque curves rather than the hp curves. Except for real out-and-out racing engines, torque curves allow us to quickly see where in the rpm band a given system should operate; but be careful to steer clear of the declining torque areas toward the left (at lower rpm) side of the graph. If you don't, you'll suffer a rapid decline in power levels whenever the engine load is increased.



The cylinder head sits on top of the liner—one of SuperTigre's usual features. Note the brass glow-plug-thread insert in the head. The connecting rod is bushed at both ends, and the piston has internal struts.

This concentration on the beneficial torque areas has a downside; the use of heavier props that increase the load on the engine obviously means higher inertia for the engine to cope with. It's better to increase rpm and decrease load either by using a lighter prop (maybe wooden) or increasing its pitch. That's why we're seeing more "strange" prop sizes: 14x14, 12x10, etc.

Remember that my prop rpm data are "static" ground-based figures. In flight, we'll see varied increases (if any) up to around 15 percent. This will depend on precise placement of ground rpm on the particular section of torque curve.

• **Idling**. Using a 15x8 Graupner prop and the Quiet muffler (providing pressure-assist to the fuel tank) led to an easily obtained 1,600rpm. The SuperTigre "Mag" twin-needle carb (now on all their engines) continues to give easily controllable operation with the usual quick pick-up to full throttle.

• **Summary**. The G90 test session produced some surprisingly good figures. Generally, SuperTigre engines are giving great value to users in a quiet, undemonstrative way. We're besieged by engines from all over the globe, so this was an appropriate time to take another look at a product from one of the most long-standing model engine manufacturers.

**Addresses are listed alphabetically in the Index of Manufacturers on page 151.*

SuperTigre G90 Sports R/C dB levels	Wind 2mph				
9 feet at AMA/USA	Bolly 15x7 (9,200 rpm)	97	92	92	93
	APC 14x14 (7,000 rpm)	87	84	88	88
7 meters at BMFA/U.K.	Bolly 15x7	88	82	83	84
	APC 14x14	82	78	80	80

Engine: SuperTigre G90 (14.7cc)
Equipment: manufacturer's 'quiet' silencer
Fuel: Methanol with 5% nitro
Temperature: 49°
Humidity: 73%
Pressure: 1002mb
Meter: Radio Shack type 33-2050 using GA601 calibrator set to NPL standards
Height: meter and engine set approximately 1 meter above concrete
Location: outdoors, next to farmland

dB meter

by GIULIANO RAIMONDI

An Italian WW II precision-scale masterpiece

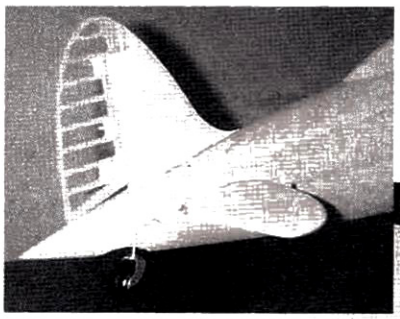
Macchi

MC.200 Saetta Fighter

THE WW II ITALIAN MACCHI MC.200 Saetta fighter was my first serious attempt at a true scale R/C model. As usual, I was unable to find accurately drawn 3-views, so I produced my own from measurements I had made of a full-size aircraft at a museum. Powered by a Webra* Speed .61 and a 12x6 propeller, my original 1/6.5-scale model had no bad flight habits. All maneuvers including spins showed no problems despite the model's small, scale tail surfaces and its asymmetrical wing design (its left wing panel is slightly longer than its right one). In the air, the model proved to be very stable despite a gross weight of almost 10 pounds that resulted in a very high wing loading. This hefty loading made takeoffs and landings especially tricky and inspired me to begin work on a second, 1/5.2-scale version of the Macchi, the subject of this article.

ITALIAN STALLION ON CAD

The plans took two years to develop and were CAD-designed. For the 1/5.2-scale model, the wingspan was increased to 79.9 inches, and all control surfaces were designed to be removable. The unusual wing-fuselage separation allows the best-possible access to the fuel tank and radio equipment. In addition, there is no visible gap between the fuselage and the Karmann (wing root) fairing. Two circular panels hide the rear wing-retaining screws, and the forward screws are accessible from inside the wheel wells. The removable control surfaces allow easy painting and repairing. The functional engine-cowl cooling flaps work with the throttle-control linkage; the two small canopy-entry doors are also functional.

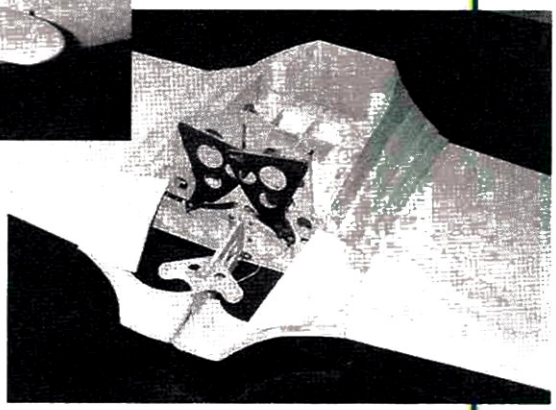


Left: the tail components are to scale and relatively small but provide adequate control and stability. Note the plywood skin on the rudder; it simulates the sheet-metal rib structure on the full-size Macchi MC.200 Saetta.

Because this project is complex and the drawings are highly detailed, here I'll concentrate only on the important details.

LANDING GEAR

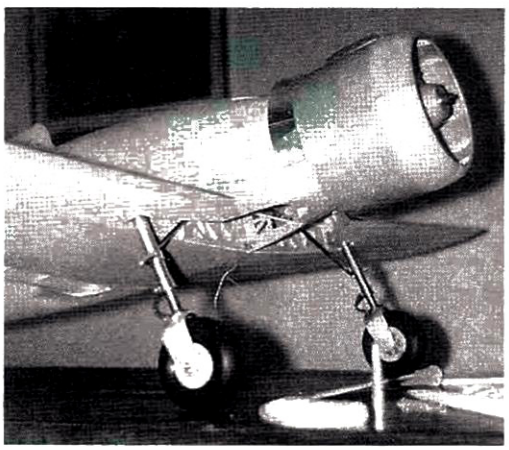
Start with the most demanding item—the landing gear; it's electrically driven and uses microswitches for travel stops. The geared motor drives two jackscrews with bevel gears; a diagonal strut that pulls the gear up is attached to the jackscrew with ball links. The gear rotates on and is supported by a long, chordwise-mounted steel tube in each wing panel. Balance springs help the gear retract into the "up" position. The struts use two coaxial springs of different lengths (the shorter one is stiffer) to absorb shock and the torque links (scissors) are functional and prevent the lower forks from rotating—an amazingly effective arrangement. I made a pair of pretty hard landings, and the model didn't bounce at all. The landing gear locks in the "up" position with spring-loaded hooks—a *must* in this kind of mechanism. The gear pistons and the rotation axles are made of medical-supply, stainless-steel tubes.



The center "wing-to-fuselage" section is built as part of the wing's upper surface—an unusual design. It houses the retractable landing gear's drive mechanism. Four bolts hold the wing to the fuselage.

Find the necessary hardware (the bevel gears are from model car accessories), then cut out of resin-impregnated fiberglass (or similar stiff material) and drill the main "triangle" that supports the jackscrew drive. If you can't machine the difficult shape of the wheel-supporting fork out of a solid block of aluminum, fashion it by bending sheet aluminum around a plywood mold, then form the conical blending between the basic fork and the circular strut base using a liquid-metal filler (J.B. Weld*). The torque links are made of Delrin plastic. The tailwheel has a double shock-absorber sys-

PHOTOS BY GIULIANO RIAMONDI



Left: the electronically driven retractable landing gear is shown here on the 1:6.5-scale version. The new 1:5.2-scale version is also scratch-built and is fully detailed on the plans. Some machining is required.

SPECIFICATIONS

Name: Macchi MC.200 Saetta

Type: 1/5.2-scale WW II Italian fighter

Wingspan: 79.9 in.

Weight: 13.3 lb.

Wing area: approx. 990 sq. in.

Wing loading: 31 oz./sq. ft.

Airfoil: semisymmetrical

Radio req'd: 6 channels (rudder, elevator, ailerons, throttle, retracts, flaps)

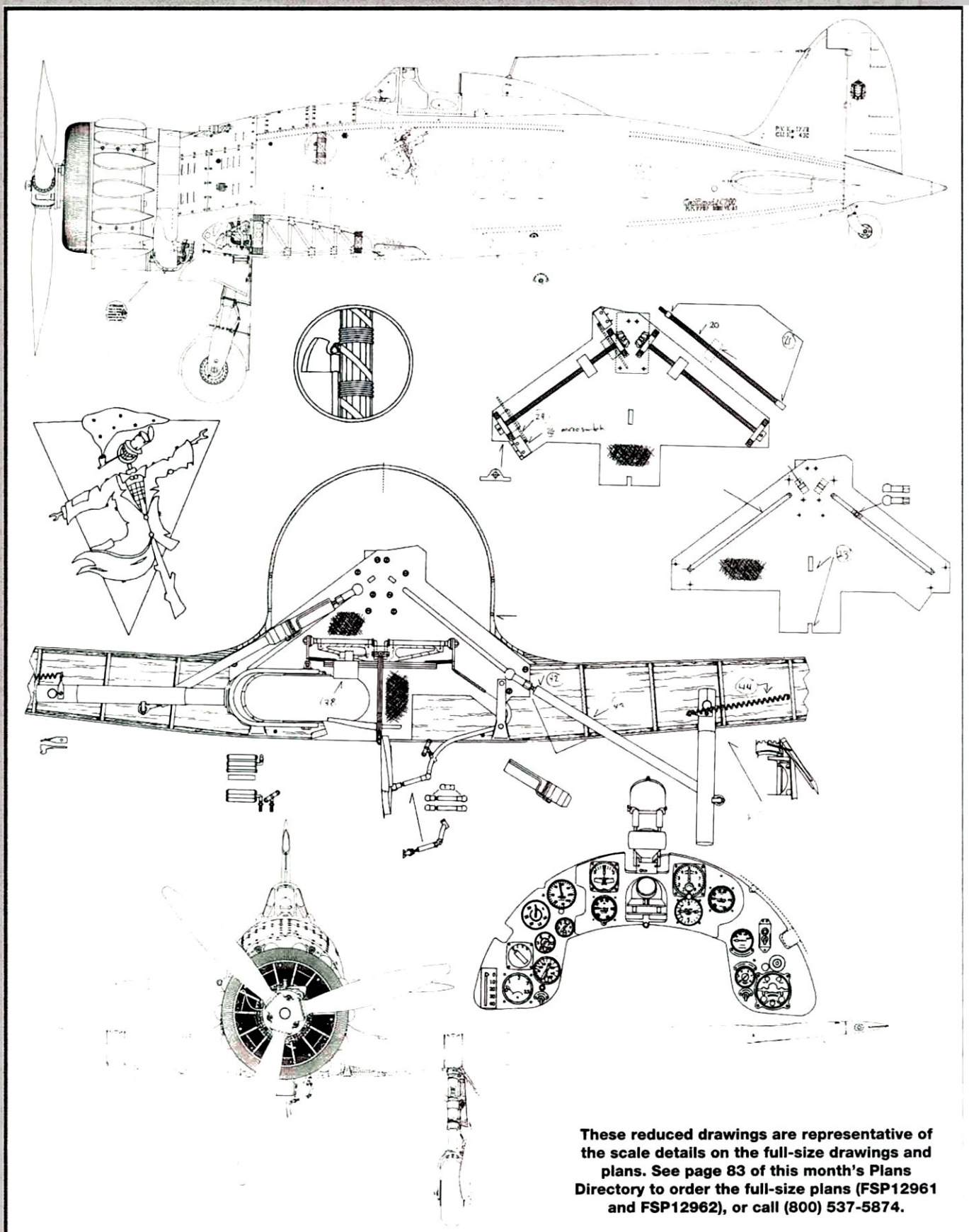
Engine used: ASP 1.08 2-stroke

Construction materials: balsa, plywood, pine, plastic, aluminum and stainless steel

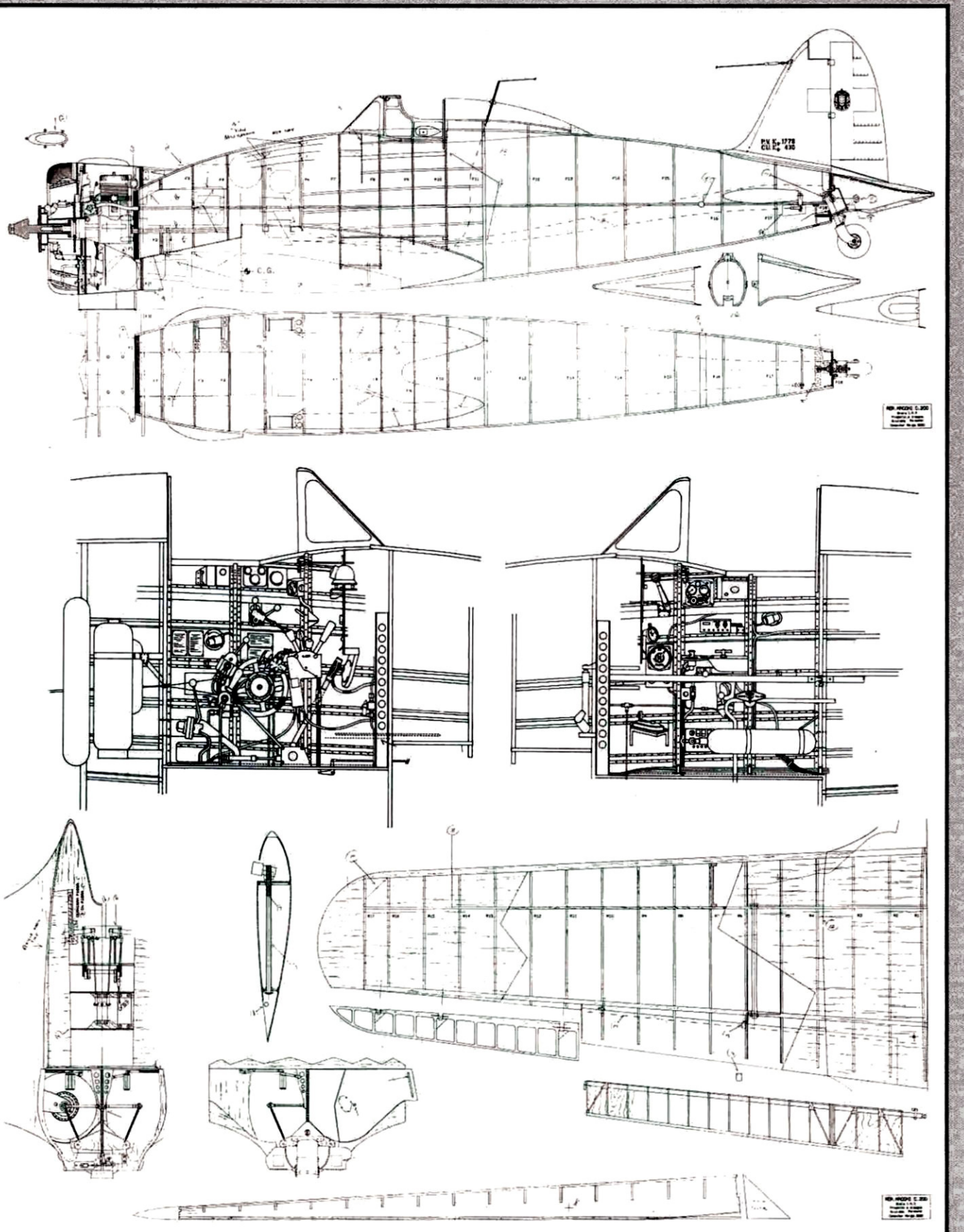
Features: the Macchi C.200 is a precision scale model of the WW II Italian fighter and is built of balsa and plywood. The fuselage is built in horizontal halves directly over the plans and is planked with balsa sheeting. The flaps and ailerons are controlled with torque tubes, and the hinging is removable and scale. The 9-page, highly detailed construction plans (FSP12961) show every piece of the model including the scale, electrically driven retractable landing gear. All scale fittings, the cockpit interior and control surfaces are shown, as is a dummy, double-row radial engine. The functional engine-cowl cooling flaps are hinged; and the cockpit doors are also functional. The wing is the same as the full-size Macchi's; the left panel is slightly longer than the right. Washout is built into the wing, and building tabs are drawn on each rib.

A set of five, full-size scale detail views (FSP12962) shows the top, left, right, front and bottom views, including rivet, screw and panel detail and insignia shape and position.

[Editor's note: more photos of the Macchi are available from Bob Banka's Scale Model Research.]*



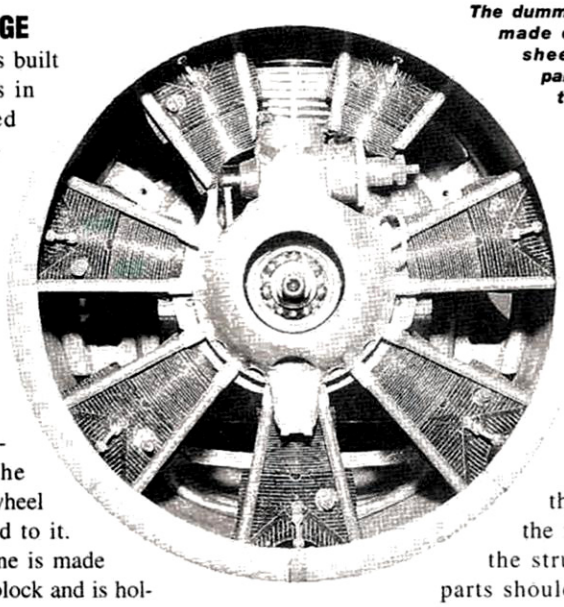
These reduced drawings are representative of the scale details on the full-size drawings and plans. See page 83 of this month's Plans Directory to order the full-size plans (FSP12961 and FSP12962), or call (800) 537-5874.



tem as in the full-size plane. You can, of course, simplify construction by building only one of the two shock-absorber systems shown on the plans.

FUSELAGE

The fuselage is built over the plans in halves joined along a horizontal plane. It's important to keep the halves of the firewall perpendicular to the building board. Former F-18 is made of plywood, and the completed tailwheel unit is attached to it. The aft tail cone is made out of a balsa block and is hollowed out as shown on the plans.



The dummy radial engine is made of thin aluminum sheet that has been painted black and has the lines scribed into it for effect. The ASP 1.08 engine is barely visible.

Apart from the cockpit interior (which I built and installed after I had joined the fuselage halves), the most annoying part of the fuselage construction is the "wing-to-fuselage" joining section; it's pretty unusual. Hoping that the plans are clear enough, my only suggestion is that you keep calm and be patient! The photos show the detail. This kind of arrangement gives the model a completely scale appearance. The radio-equipment layout shown on the plans is the best I could find; to minimize the nose-ballast requirement, keep the tail section as light as possible.

The engine shown on the plans is an ASP* 1.8. It offers a good performance-to-price ratio, but of course, you can install other powerplants in the nose with minor modifications. There's enough room to accept a 2-cylinder, 1.60 4-stroke, but some extra work on the firewall, dummy engine and engine bearers will be required.

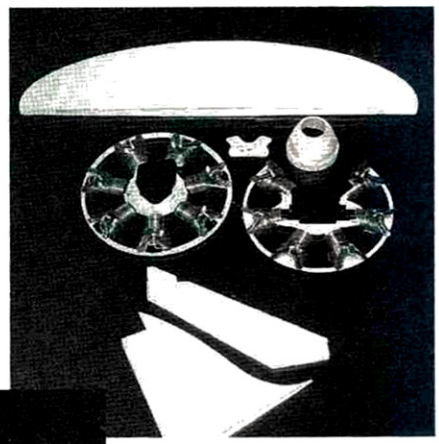
Before joining the fuselage halves, install all the pushrods and associated control linkages, including the receiver antenna-routing tube, and cut lightening holes in all balsa formers. Don't be afraid to cut these holes; the final epoxy-glass finish will add tremendous strength. If you aren't as crazy as I am, do the cockpit work now, or at least finish smooth the inner cockpit walls, and add the instrument panel.

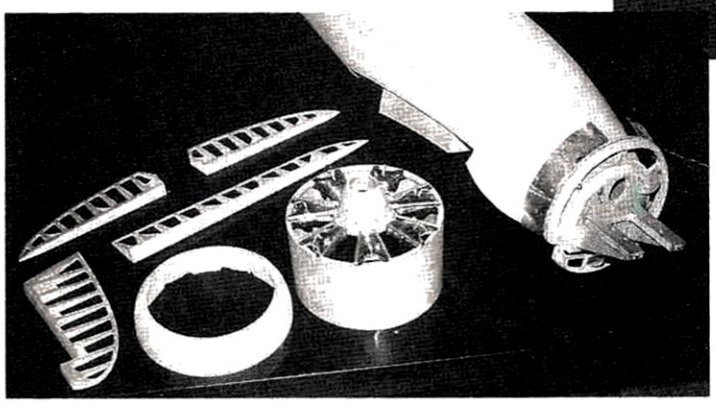
The vertical fin, rudder, horizontal stab and elevators are also built in halves; first build and sheet the top half over the plans, then add the lower half of the ribs to complete the structure. The tail parts should give no problems; their construction is typical of other scale models. The plans show all half-rib patterns as well as some cross sections. The leading edges are formed with laminated balsa. Use lightweight balsa and very thin plywood where indicated. Before you cut out the simulated rudder and elevator ribs, apply thinned epoxy to the plywood to strengthen the plywood and minimize the work needed later to seal and smooth the wood.

WING CONSTRUCTION

The wing is of conventional construction, with one exception. The full-size fighter has a longer left wing panel than the right (of course, the left aileron is a little longer than the right); my model duplicates this feature. The left wing panel has 17 ribs and the right, 16. The wing incidences are +1.5 degrees at rib 1 and zero at rib 16. The ⅛-inch-thick main spar is very easy to set up and is really strong, despite the longitudinal grain of the balsa section. To make construction easier, building tabs are included on the rib drawings. When you position rib 1, use the dihedral reference pattern provided on the plans. Note that the trailing edge of the inner section of each split flap is slightly curved, to blend into the shape of the lower Karmann fairing. The left wing panel is identical to the right, up to rib 16; then it has an additional rib, 17.

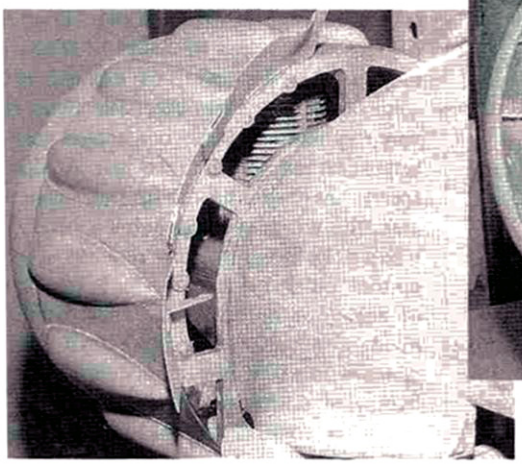
The flaps and ailerons are actuated by means of torque tubes—no visible hinges. The bases of the flaps are made of thin plywood (0.4mm). Ribs can be made of ply or plastic, but it's easier to drill the many small lightening holes in plastic. If you select plywood, be sure to apply epoxy* or CA before you saw and drill the holes. Cut the flap spar (torque tube) out of an aluminum tube. Also, cut the aileron torque tube (which runs through the flap's tube spar) out of a thin, stainless-steel medical tube. Close one end of the aileron tube with a small piece of hardwood; you will insert the fiberglass actuating arm into this and seal it with glue. Close the other end of the aileron tube with a small block of brass. Solder it into place, then drill and



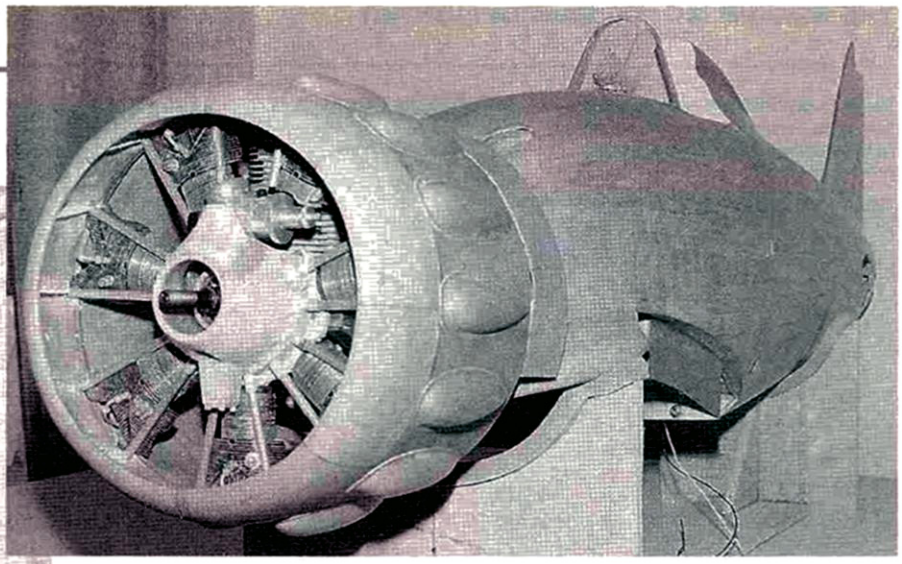


Above: at the top is the completed horizontal stab. Below it is the double-row dummy radial engine and the finished vertical fin.

Left: the ailerons and elevator are built in the same way as the rudder using plywood shims cut out to simulate the rib details. Here, you'll also see the engine-mount detail and the engine cowl with the dummy engine fitted into place on the original 1:6.5 version.



Below: the functional engine-cooling flaps are hinged; they are tied into the throttle-control linkage.



Above: the completed fuselage with the engine cowl attached. The rocker-arm blisters attached to the cowl are made by forming sheet aluminum over plywood molds. Note the gun-sight glass in the finished cockpit.

:ap it at the correct angle in relation to the actuating arm, to accept the screw that :nds with the ball-link control-linkage ittachment. It is essential that the inner ube has no play at all in relation to the outer one. Remember: there are right and eft tubes. Cut the plywood flap base, ipply thinned epoxy, and sand. Construct he hinges as shown on the plans. Cut out all ribs, and drill the holes for the torque tubes. After you insert the tube in the appropriate holes, position the ribs on the plywood base, and glue each to the base, but don't glue the ribs to the tube yet.

Slide the tube into position, and fit the hinges between the appropriate ribs. Complete the Karmann fairing, then cut the flap opening in the bottom of the wing and the slots for the forward end of each hinge. Next, glue into place the plastic doubler that holds the inner end of each tube to the false rib. Assemble the flap by first inserting the torque tube in the hole in the doubler, and then installing the two

Some of the landing-gear parts and the lower gear door. A lot of metalwork is involved.

hinges in the wing slots. When you are satisfied with their fit, remove them and apply slow-setting epoxy to the slots and to the hinges' fixed arms as well as to the tubes and the ribs. Slide the aileron torque tubes into the flap spar tube with the actuating arm on the correct side. Reattach them carefully, and align the trailing edges of the wing and the flap as well as the outer end of flap with the aileron cutout. Make sure the inner section of the flap trailing edge follows the shape of the Karmann fairing. Hold the two trailing edges together by your favorite method, and go to bed until the epoxy cures.

Aileron construction is simple, but pay attention while you position

PREWAR MACCHI

Faced with the problem of designing a new single-seat, cantilever low-wing fighter around the fairly low-powered Fiat A.74 RC.38 engine (rated at 840hp), Italian aircraft designers Macchi and Fiat came up with two fighters that looked very much alike. In fact, the superior airframe of the Macchi MC.200 Saetta (Macchi design team for this project was led by Mario Castoldi) made it the faster of the two. The prototype was first flown on December 24, 1937; although it wasn't able to match the German, French and British designs of that time, the Regia Aeronautica ordered the MC.200 into production as one of the replacements for the Fiat C.R. 32.

When Italy entered WW II, 150 were built and delivered, but the final production number was around 1,000. Most were flown with open cockpits, and the A1 and A2 versions were similar, but the A2 had a stronger wing that would carry heavier bomb loads. It first saw action in Malta and later in Greece, Russia and North Africa; its first real air opponent was the Hawker Hurricane. After seeing almost 10 years of service, it was eventually retired in 1947.

SPECIFICATIONS

Engine: Fiat A.74 RC.38 double-row radial

Span: 34 ft., 8 ½ in.

Length: 26 ft., 101/2 in.

Max. weight: 5,132 lb.

Max. level speed: 312.5mph

Range: 540 miles

Armament: two 12.7mm Breda-SAFAT machine guns

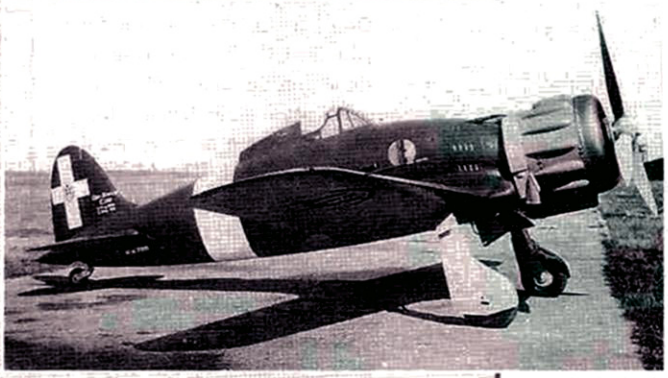
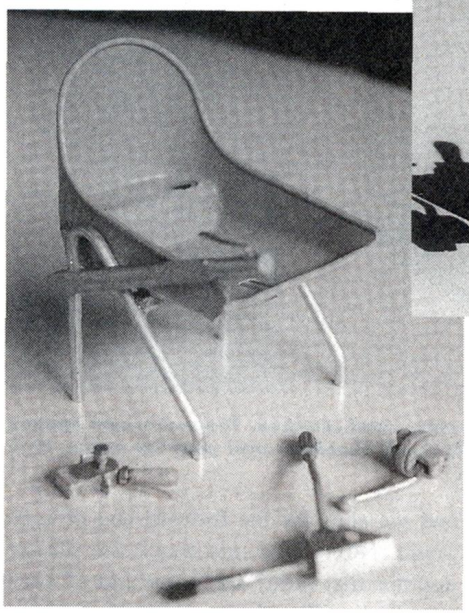
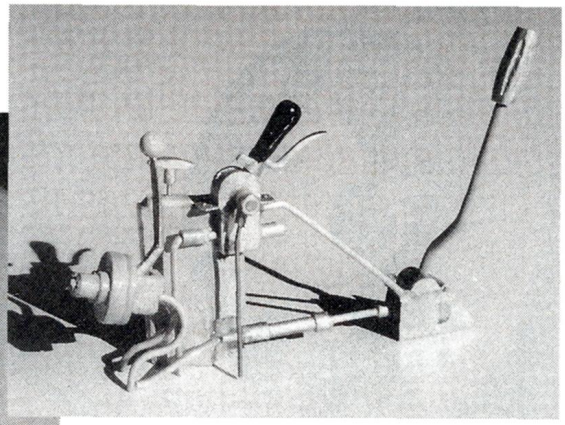


PHOTO COURTESY OF PETER BOWERS





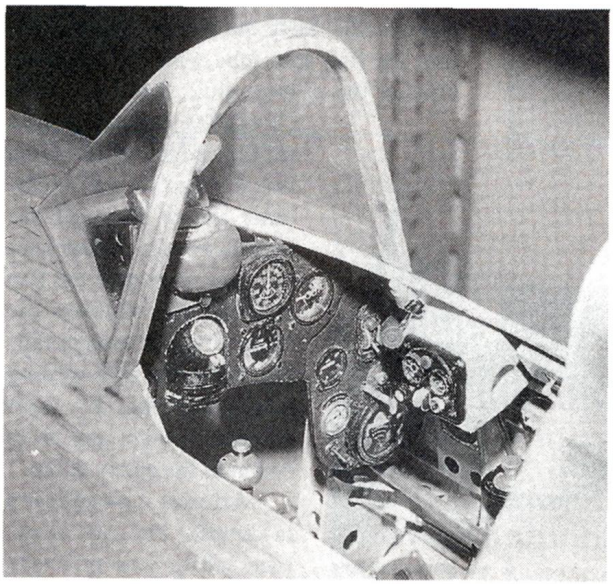
Some of the sidewall cockpit detail was built separately and then added to the cockpit after the model had been completed.

the plastic doubler at its root. The slot in the doubler must match with the actuating arm that is aligned with hinges' axis. Joining the aileron hinges to the wing is similar to attaching the flap. After the epoxy has cured, solder a small brass washer to the inner hinge pin, flush with the hinge side to prevent the aileron from moving laterally. You can make things easier by using commercial hinges for the ailerons, but I think that making those delicate, flapping things removable is worth the extra effort.

SCALE FEATURES

The engine cowl's rocker-arm blisters, cooling flaps, gear doors, canopy doors, cockpit floor, gear door support brackets, navigation-lights fairing and dummy cylinders are made of aluminum sheets of various thickness and stiffness, and they were cold-formed over wooden molds. The functional exhaust tubes are made from 0.1mm stainless steel. Except for the silk-covered ailerons, rudder and elevator, the finish is lightweight fiberglass cloth applied with thinned epoxy resin. All insignia, numbers, etc., were either sprayed on or hand-painted.

The simulated, double-row radial engine was made in two parts: the forward row was glued to the cowl, and the aft one was attached to the engine bearers. Each cylinder was made of three sections cut out of thin aluminum and painted glossy black; then parallel lines were scratched onto them with a sharp point. When they had been bent to shape, they were contact-cemented to the balsa-ply frame—time-consuming but easy and effective.



The cockpit detail is totally scale and finely appointed. The windshield frame was made of laminated wood, and the entry doors are hinged and functional.

FLYING

Don't try to fly your model with the CG aft of the location shown on the plans. The very small scale stab/elevator section requires a more forward CG than usual. The Macchi MC.200 Saetta is very stable, yet it has a quick, smooth response to every input. Of course, the model is fully aerobatic—just like the real thing! I even made it do the most beautiful spins (intentionally). On takeoff, I suggest that you use about 5 degrees of flap and be ready to feed in more right rudder than usual; this requires some tail-dragger experience. The model is very responsive and has good control characteristics, right down to the stall. At slow speeds, the model has no tip-stall tendencies; the wing washout helps a lot. On landing, lowering the gear requires some up trim; otherwise, its behavior is like that of any good pattern plane. The model needs about 20 to 30 degrees of flap, which works well in calm conditions or a light wind; otherwise, keep it clean.

For the controls throws, I would begin with these values:

- **elevator**—15 degrees both up and down;
- **rudder**—20 degrees left and right;
- **ailerons**—12 degrees up and down.

I also strongly recommend a gyro-assisted rudder for takeoff—at least for that first flight!

Giuliano's daughter Elena admires her father's handiwork.

If you want something a bit different in the way of scale WW II heavy metal, give this Italian stallion a try. The Macchi MC.200 Saetta will please even the most jaded scale modeler. I wish you all "one-piece landings."

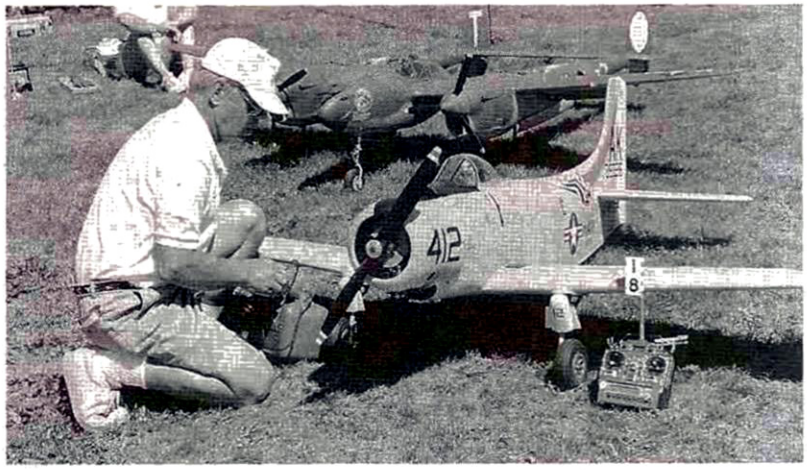
**Addresses are listed alphabetically in the Index of Manufacturers on page 151.*

About the author

Born in Bologna, Italy, Giuliano Raimondi has been modeling off and on for nearly 32 years. He began in 1948 with small, rubber-powered models. In the '50s, he designed and built several control-line scale and aerobatic models, and in 1968, he began in R/C. He received his pilot's license in 1956, served with the Italian Air Force from '59 to '61, when he flew the Stinson L-5, T-6 Texan, T-33 Thunderbird and the Fiat G-91. From '61 to '94, he served as captain instructor for Caravelle on Boeing 727s and 747s and on MD-80s. His total flight time is more than 15,000 hours. He has also flown several sailplanes. His address is Largo Olgiata, 87 / A2, 00123, Roma, Italy; email mc2489@mclink.it.

by GEORGE LEU

ZIROLI PLANS AND SHEETING WITH BALSA

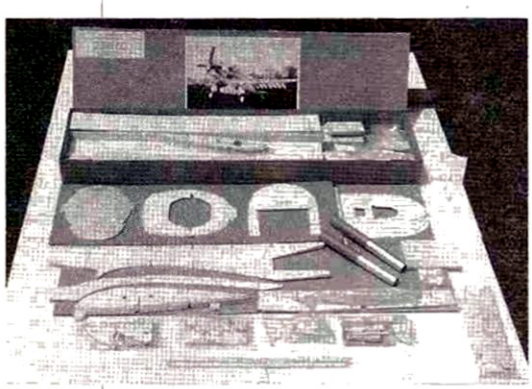


Nick Ziroli Sr. fuels up his newest warbird—the Douglas AD-1 Skyraider. Nick's equally impressive P-38 Lightning is in the background. Both are available as kits from The Aeroplane Works.

NICK ZIROLI and his son Nick Jr. have been designing planes and selling plans since I started to fly R/C in 1968. Their designs have always initiated trends in the hobby and, these days, they are leaders in giant-scale warbird design.

Currently, their warbird plans include a Ju-87B Stuka, a P-47 Thunderbolt, an F4U-1A Corsair, a P-51 Mustang, a P-38 Lightning, an AD-1 Skyraider and an F6F Hellcat to name just a few. All their plan sets are beautifully drawn and highly detailed. At many giant-scale warbird rallies, Ziroli designs dominate the field.

To complement their plans, Nick Ziroli Plans* (owned by Nick Jr.) offers a number of giant-scale accessories, including fiberglass fuselages, cowls, canopies, retracts, fuel lines, engines and modeling clamps. The Zirolis fly what they design, and they've both done very well at the Scale Masters and Top Gun. To find out more about giant warbirds, send $2 for their new catalogue.



This Douglas Skyraider is from Chuck Gill's The Aeroplane Works. The fiberglass cowl, canopy and full-size plans are available from Nick Ziroli Plans.

The Aeroplane Works*—operated by Chuck Gill and his sons, Mace and Keith—makes full kits of Nick Ziroli designs. They produce some of the finest wooden parts I've ever seen, and their attention to detail and overall kit quality is well beyond what I would expect from any manufacturer. I recently toured their facility, and I was impressed by their craftsmanship and the pride they take in their products.

This flight box is new from The Aeroplane Works. Complete with power panel and fully charged batteries, the unit comes wired for 12 and 24 volts, and it can even charge your glow-driver Ni-Cd.

Chuck and his sons not only cut wood and bend wires for the Ziroli plans, but they also work very closely with them to ensure that the wooden parts match those shown on the plans. Every kit that The Aeroplane Works produces has a money-back parts warranty.

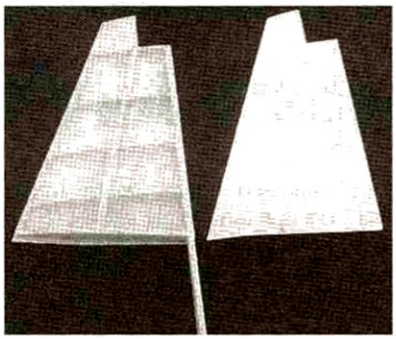
BALSA SHEETING

Many would-be scale modelers shy away from airplanes that require a lot of balsa sheeting (e.g., warbirds), because they don't know how to apply balsa to curved surfaces. The following technique for sheeting fins and stabilizers should help create a true, warp-free surface.

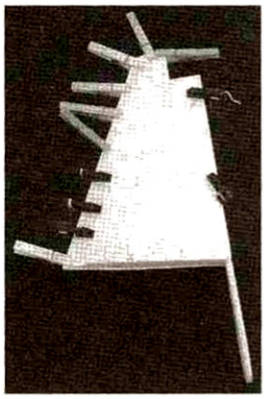
After building the part to be sheeted (in this case, a Hellcat vertical fin), I join the sheeting with Pica's* Glu-it to form one large sheet that's big enough to cover half of the part. I cut the piece so that it overlaps the fin by about ½ inch all the way around, then I dampen the outside with a wet sponge. After a few minutes, when the outside grain has absorbed the water and starts to curve, I pin the sheet to both sides of the fin. To make it conform to the fin's shape, I hold it securely with a lot of straight pins, clothespins and tape, and then I let it dry overnight. When I remove the pins, etc., the sheet will retain the exact shape of the fin.

Remove one side of the sheet and, using a ballpoint pen, trace the internal structure onto the inside of it. Remove that piece, and do the same for the other side. The outline acts as a gluing guide. Trim the sheet closer to the fin's shape, and glue it onto the fin. The sheet has been shaped, so the glue joints require fewer pins, etc, and the procedure is a lot easier than trying to cover it in one sitting.

• **Suitable glues.** For the first half of the sheeting process, CA works best.



To cover surfaces with balsa sheeting, first join enough pieces of it to make a sheet that will cover half of the part (one side).



Water applied to the outside of the sheet allows it to soften. When all the water has been absorbed and the sheet starts to curve, pin it to the part with pins, clamps, and/or tape and allow it to dry.

To "close up" the structure, I use a slow-drying aliphatic adhesive, e.g., Elmer's Carpenter's Glue.

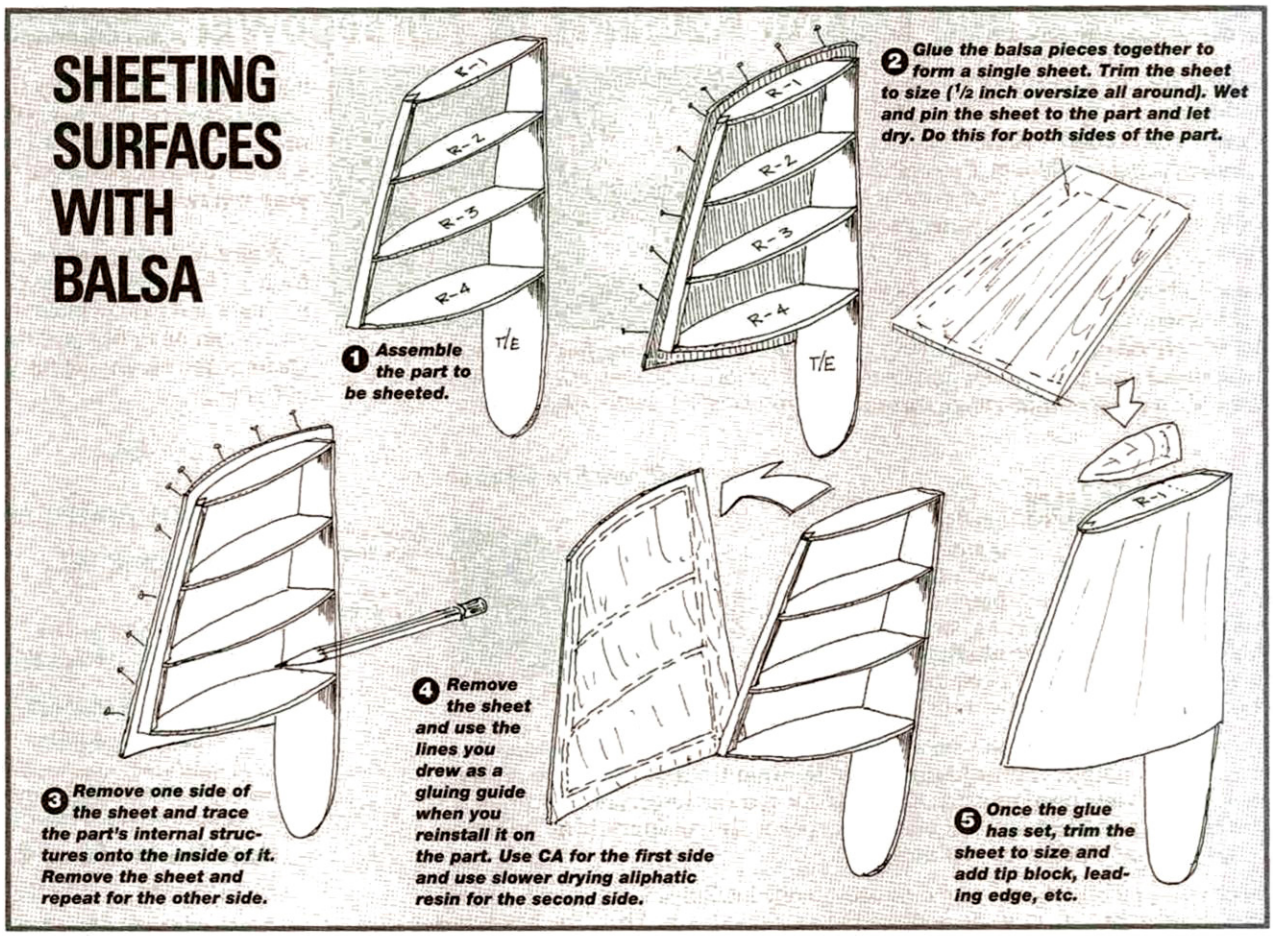
Pin the first half of the sheet to the fin, and from the inside of the fin, apply thin CA to it. Make sure that the structure is straight and true; then apply adhesive around all the ribs and edges, and use the appropriate kicker. Apply aliphatic resin to the second sheet (using the guidelines you already traced on the wood), and pin it into place. Once the glue has dried overnight, the part can be trimmed to size, and the leading edge and tip blocks can be added.

When the balsa sheet has dried, it retains the shape of the part to be covered and can be easily glued into place.

TAKE *FLIGHT*

If you haven't yet seen *Flight*—Air Age Publishing's newest magazine—you're missing out on a great full-size-aviation magazine. It's launch as a quarterly was so successful that it's now to be published six times a year, and I just received the most recent issue. I like it! It's full of historical aviation photos (many from the *Model Airplane News* archives), interesting stories and, best of all, full-color photos and many 3-view drawings of heavy-metal warbirds. The premier issue included articles on the F-15 Eagle, the Brewster Buffalo and the Waco SRE and a great story about a pilot who was shot down over enemy lines and stole a Focke-Wulf 190 to get back home! The second issue contains a close-up of the P-51 Mustang (great color interior and exterior details) and articles on the Grumman F-8-F Bearcat, the A-6 Intruder and the Aeronca C-3 Flying Bathtub. It's a great resource for documentation, and it's just plain fun to read. Right up there with *Model Airplane News*, it's on my "must read" list. Check it out; the third issue will be available on October 15.

**Addresses are listed alphabetically in the Index of Manufacturers on page 151.*



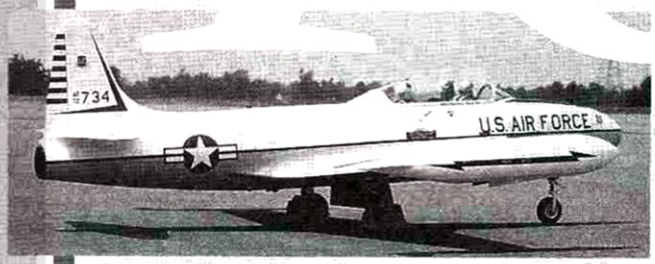
Hal Parenti's Fireball in flight. A closer look (below) shows why it finished first in Designer Scale.

by JIM SANDQUIST

70 YEARS OF OPEN COMPETITION

AMA Scale R/C

THIS WAS a special year for the Nationals as it celebrated its 70th anniversary, and for the first time, the month-long contest was held at the AMA's national flying site in Muncie, IN. The Nats are open to any modelers who wish to compete, and as I covered the three-day scale R/C competition, I was pleased to see many new faces among the 48 registered pilots. There are three classes at the Scale R/C Nats: Designer, for modelers who completely design and build their own aircraft; Expert, for modelers who build from plans or kits; and Sportsman, for beginning scale modelers who want to learn the ropes of scale competition while flying with and competing against some of the best scale modelers.



This beautiful Lockheed T33A was entered by Jeff Foley and finished third in Expert.

THE SITE

The flying site in Muncie (which is only a day's drive for 80 percent of the AMA membership) features two 700-foot-long runways and a flying field clear of obstacles. Under AMA contest rules, the models are first static-judged for accuracy of

Steve Sauger and his Sea Fury flew well throughout the competition.

Greg Hahn and his first-place B-25. It also won the NASA Flight Achievement Award.

irst turbine flown in competition at the Nats: nd Hamilton's second-place Lockheed DT-33B Star." The propane-powered JPX T-260 turbine ded great performance for the plane but also a sound that must be heard to be appreciated.

Larry Sutherland continued the WW I tradition by flying a wonderful SE-5a built from a Proctor kit. This beautiful 73-inch-span biplane was wonderfully detailed with rib stitching, brass grommets and side-panel lacing.

Nationals

outline, craftsmanship and finish, color and markings. Then they take to the air for four rounds of flying and are judged on takeoff, a figure-8, a flyby, landing and realism in flight. Pilots also perform five optional maneuvers. Each pilot's best three rounds are averaged; this average is added to the static score to obtain a final score.

When a diversion from flying was needed, the AMA Museum provided a chance to cool off while learning about the history of our great hobby. Every AMA member should see the museum at least once!

1997 NATIONALS

Next year's Nats will again be held in Muncie in early July. This is your chance to get involved with scale competition and meet some of the best in the business. If you haven't competed in scale, contact the AMA for the rule book, which explains everything you'll need to know to compete. Then make plans to join us in 1997!

WINNERS

DESIGNER SCALE

Pos.	Pilot	Plane
1	Hal Parenti	Ryan Fireball
2	Charlie Nelson	Waco VKS 7 F
3	Corvin Miller	Globe Swift
4	Bob Patton	T-34A
5	David Hayes	Ayres Thrush
6	Wayne Siewert	Porsche Mooney
7	Bob Karlson	Wildcat
8	Mike Gretz	Piper J3 Cub
9	Harold Hester	Spacewalker 2
10	Carl Pierson	Lockheed Dipper

EXPERT SCALE

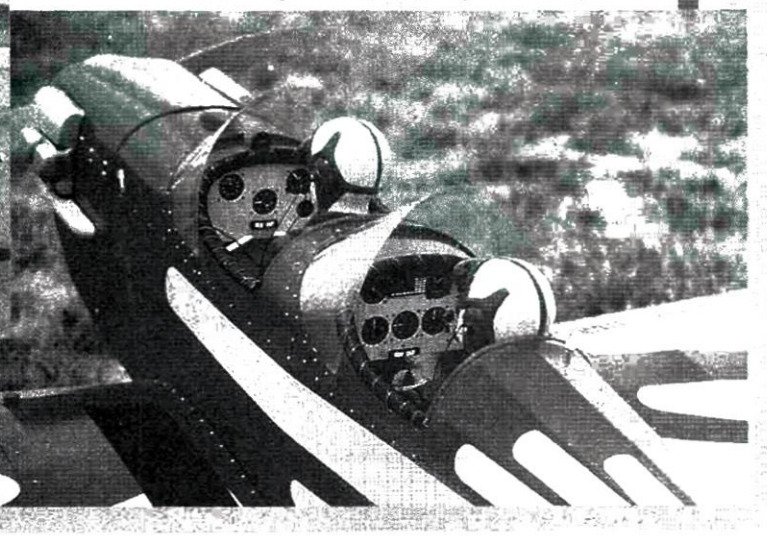
Pos.	Pilot	Plane
1	Greg Hahn	B-25
2	Garland Hamilton	DT-33B
3	Jeff Foley	Lockheed T-33A
4	Hal Parenti	B-25J
5	Roger Shipley	T-33
6	Jim Sandquist	P-51 D
7	Albert Kretz	Spitfire
8	Dave Vogland	SNJ-5B
9	Skip Mast	J3 Cub
10	Steve Sauger	Sea Fury

SPORTSMAN SCALE

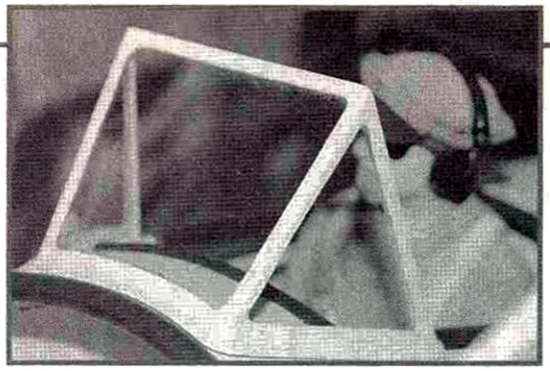
Pos.	Pilot	Plane
1	Gary Parent	Piper J3 Cub
2	Ron Gagner	Morrisey Bravo
3	John Wood	Clipped Wing J3 Cub

Bob Patton and his design, a Beechcraft T-34A. Bob placed fourth in Designer Scale.

Harold Hester built this Spacewalker 2, which is beautifully detailed all the way to the cockpit!



MODEL AIRPLANE NEWS
HOW TO



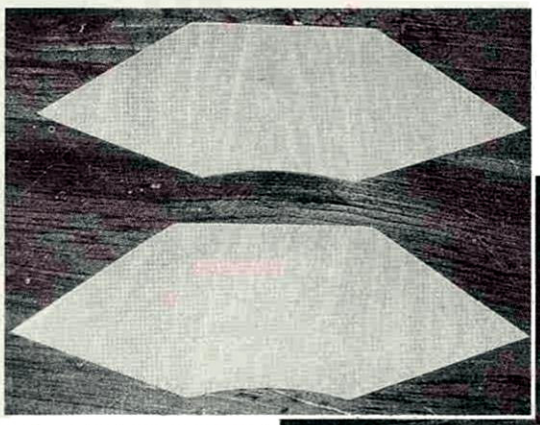
A simple way to dress up your open-cockpit model

Make Scale Multi-Panel Windshields

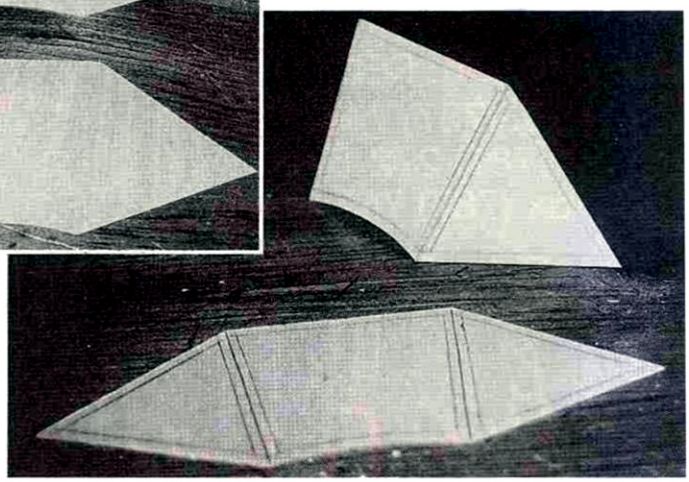
by GERRY YARRISH

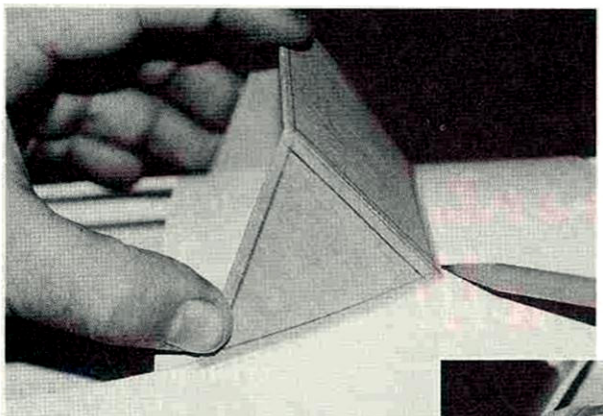
Scale open-cockpit models have one thing in common—windshields. Whether they use simple wrap-around or multi-panel windshields, models need this detail to look complete. Here's a simple way to reproduce a good-looking, scale, multi-panel windshield for your next open-cockpit airplane.

1 Most plans will have a flat template for the windshield appropriate for your model. If you are scratch-building, use some card stock or stiff paper and develop your own pattern. Here is the pattern included with my Ziroli/Aeroplane Works* PT-17.

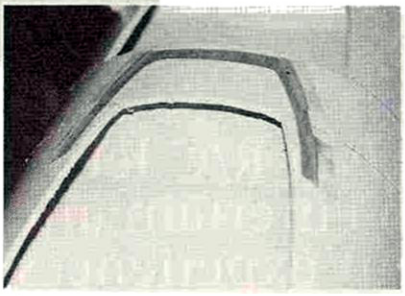


2 Following the template, draw the pattern onto 1/32-inch-thick plywood. Because the Stearman PT-17 has twin cockpits, I've cut out two windshield blanks. These will be used to produce the framework for both windshields.



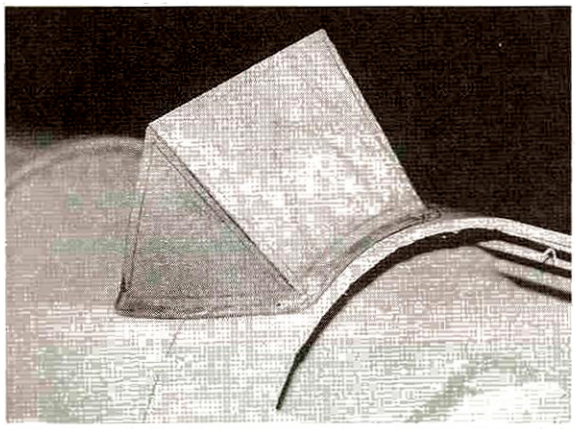


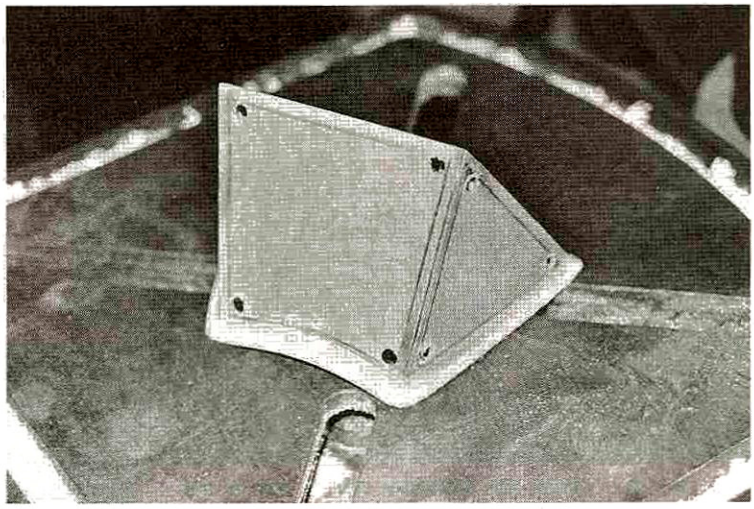
3 Draw the frame outlines and the corner seam lines on the blanks. Using a sharp modeling knife, cut partway through the blanks along the seam line. Do not cut all the way through; you simply want the cut to act as a hinge so that you can cleanly bend the blank along the corner seams as shown.



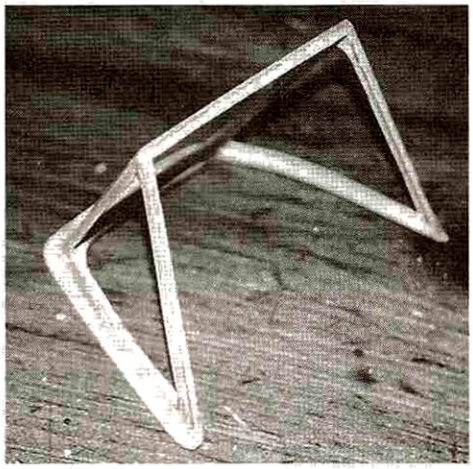
4 Wrap a piece of paper over the cockpit opening and tape it into place where the windshield will be seated. Place the windshield blank over the paper and trace its bottom outline where it comes in contact with the paper. This outline will serve as the centerline for the bottom edge piece of the finished windshield.

5 Remove the paper from the model and draw the outer edges of the bottom edge piece around the centerline about 1/8 inch all around. What you will end up with is a U-shaped pattern, as shown. Trace the pattern onto 1/32-inch-thick plywood and cut out the bottom edge piece. Tape the U-shaped edge piece into place on top of the fuselage. Note that the fuselage is finished and painted before the windshield is built.



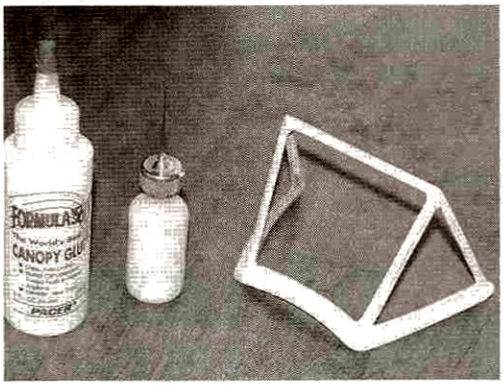


6 Place the bent windshield on top of the bottom edge piece, and glue it with CA. The bottom edge of the windshield should be placed on the centerline. Note that the windshield assembly is now quite stiff and holds its shape.



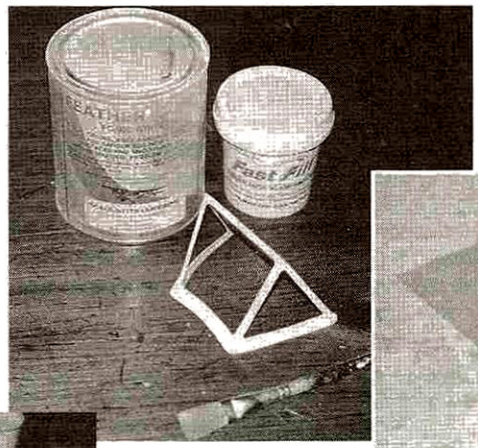
7 Drill 3/16-inch-diameter holes in each of the windshield-panel corners.

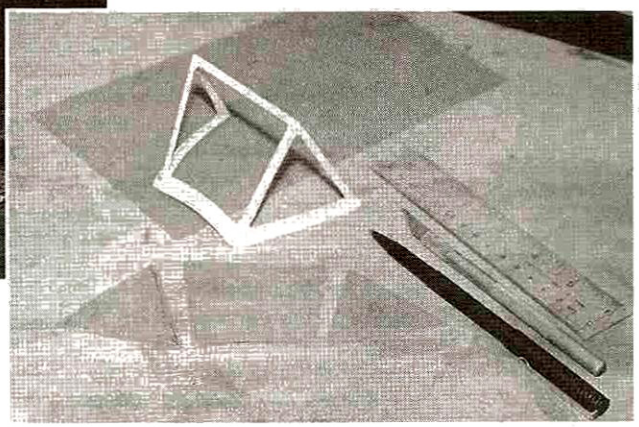
8 Now cut out the unwanted center panel areas, which will leave the thin framework shown here. I used a thin cut-off wheel in my Dremel* Moto-Tool to do this quickly and precisely. Now glue three, 3/32-inch-wide edge pieces to the aft edges of the windshield. These edge pieces strengthen and stiffen the finished windshield.

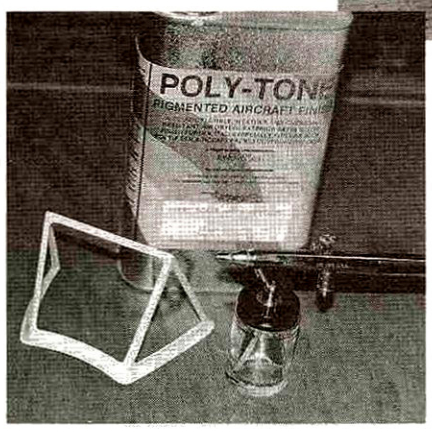


10 I added surface detail (rivets) along the edges of the bottom edge piece and the center of the frames. I used Pacer Technology* Formula 560 mixed 60:40 with water and applied the mixture with the IMP* squeeze bottle shown. Let the "rivets" dry overnight.

9 Along the bottom edge of the windshield, make a fillet of hobby filler that blends the bottom edge with the vertical windshield frames. Let the filler dry and sand it smooth with 320-grit sandpaper. Sand the entire windshield again and prime it with two coats of wood primer. I used F&M Enterprises* Feather Coat. When everything is dry, sand again and re-prime if necessary until you have a smooth, grain-free finish.



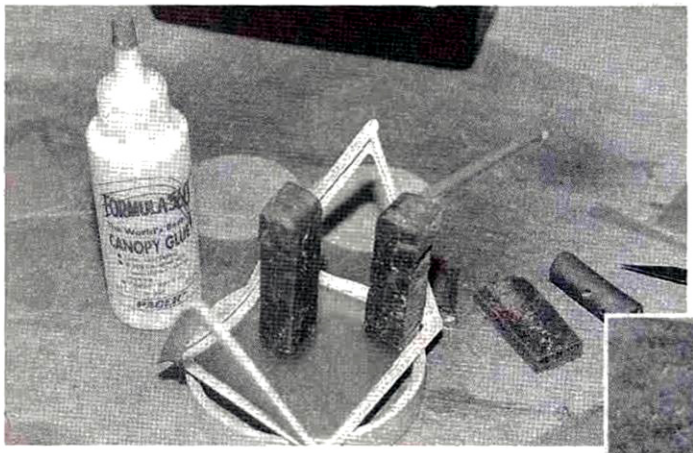




11 Paint the finished windshield frame with a color that matches your model. I used F&M's Poly Tone paint applied with a Badger* Model 150 airbrush. Paint the entire frame (inside and outside edges), and let it dry.

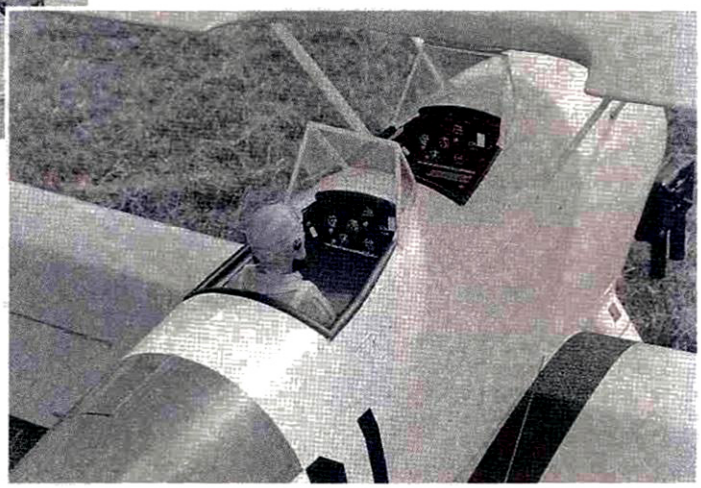
12 For the clear windshield panes, I used Sig* 0.030-inch-thick clear-plastic sheet. Place the framework over the plastic, and trace its inside edges onto the plastic. Do not remove the plastic's protective covering, but trace onto it. Cut out each of the panes, leaving approximately 3/32 inch all around the traced lines.

MAKE SCALE MULTI-PANEL WINDSHIELDS



13 Next, remove the protective material only on the side that comes in contact with the framework, and glue the clear plastic into place one pane at a time with Pacer Technology Formula 560. If you leave the inside of the plastic pane protected with the protective covering, you'll be able to use lead weights to hold the pane in place while the glue dries (without fear of scratching the clear plastic). Repeat the process for each of the remaining panes.

14 When all the windshield panes have been glued into place, remove the inside protective material, and glue the completed windshield framework into place with Formula 560. That's it! Stand back and admire your handiwork. When added to your model along with some scale instrument panels, a scale pilot bust and some coaming around the cockpit opening, windshields add much to the realism of any scale model. Give it a try; you'll be pleased with the results.



*Addresses are listed alphabetically in the Index of Manufacturers on page 151.

MODEL AIRPLANE NEWS

FIELD & BENCH REVIEW

KYOSHO Soarus Sport

New wings for thermalling

by ROGER POST JR.

IF YOU'RE LOOKING for a quick and easy way to get into R/C flying, the Kyosho* Soarus Sport glider is for you.

The main difference between the new Soarus Sport and its predecessor is the wing and tail surface construction. The older model had built-up surfaces, but the new one has a foam-core wing with factory-bonded composite skin and molded, pre-hinged tail feathers. Construction is not difficult; just make sure you study the manual and its addendum carefully before you start. The addendum has some very helpful hints that actually make the construction process easier than it sounds in the manual.

The Soarus Sport at rest before its first flight.

The sun shines through the Soarus wing, highlighting the details of the wing construction.

CONSTRUCTION

• **Wing.** Because the manual clearly explains how to assemble the glider, I will touch on some points that might need clarification. I would build the wing first. When it's time to install the radio and battery in the fuselage, you'll need the wing with its aileron servo installed to check the fit of the battery and the battery-tray placement in the fuse. I built the glider according to the instructions, and it turned out that the aileron servo and pushrods interfered with these two items. When I installed the aileron servo in the wing, I had to add some wood under the servo before I secured it in place. This prevents the pushrods from hitting the wing surface and provides more clearance for a longer servo arm in the bottom of the wing-servo cutout. If you use the recommended servo-arm length, you wind up with hardly any aileron movement.

The aileron-servo and control-rod installation require some experimentation to get the right amount of control-surface throw. Make sure that you cut the material between the aileron and wing panel along the ailerons' attachment points (but not the hinges) to ensure their free movement.

Besides the double-sided tape used for holding the aileron servo in place, I used a strip of clear packing tape over the servo. The servo wasn't absolutely secure when it was held in by the double-sided tape, but the addition of the clear tape really secured it.

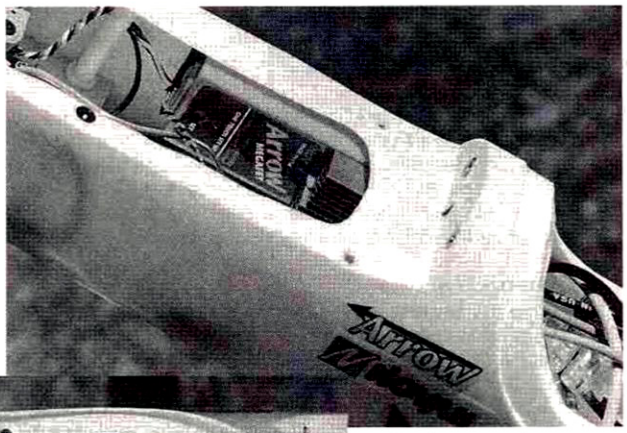
• **Fuselage** I had to rethink the radio installation, and I came up with the following:

• The battery lies flat on the bottom of the fuselage and is held in place with Velcro®-brand fasteners.

• The servo tray is installed according to the instructions.

• The battery's aft end rests against the servo tray's front end.

I mounted the Novak Arrow speed control on the left side of the fuselage with Velcro®-brand fasteners. Because of the size of the powerful 7-cell, 1800mAh SR battery pack, this was the best location for the Arrow.



I had to improvise on the radio setup. I removed the battery tray and attached the SR 7-cell pack to the bottom inside of the fuse with Velcro®-brand fasteners. I used Velcro® to attach the switch to the right side of the fuse just behind the forward wing-attachment area. I coiled up all the wires and placed them on top of the forward battery area. Here, the battery wire has been disconnected for safety.

• The receiver is installed aft of the servos and held in place by Velcro®.

• The Novak* Arrow speed control is installed on the left side of the fuselage with Velcro® and is on the CG.

Install the motor and finish the rest of the fuselage according to the instructions.

When I attached the wing-bolt hold-down nuts and their plastic receptacles, the CA didn't hold the plastic receptacles to the fuselage very well. I had to redo this step, and I devised the following method to make them stay in place: drill two holes in a piece of scrap plywood that are the same distance apart as the holes in the wing hold-down area of the fuselage. Use 80-grit sandpaper to rough up the plastic parts that are to be glued together, then thread the wing bolts through this "template" and into the hold-down nuts. The tension this creates, along with CA and the two small sheet metal screws, will ensure the proper alignment and the adhesion of these parts. Just be sure that you don't get any CA in the wing bolts' threads.

• **Tail feathers.** The addendum recommends that you don't cut the rudder off the vertical fin when you install the fin. I concur because if you remove the rudder and hold it on with the recommended tape, it will eventually move back a bit, and the hinge joint will become very sloppy. It takes a bit of manipulation to install the vertical fin as the addendum describes, but it's well worth the effort.

When you install the tail surfaces, clean off any flashing that might be on the

SPECIFICATIONS

Model: Soarus Sport

Type: electric-powered thermal glider

Manufacturer: Kyosho

Wingspan: 72 in.

Wing area: 498 sq. in.

Weight: 50 oz.

Wing loading: 14.4 oz./sq. ft.

Airfoil: S-3021

Length: 40 in.

Motor: Mabuchi 550SH

Prop: folding 7x3 (supplied)

Radio req'd: 4-channel (speed control, rudder, elevator, aileron)

Radio used: JR* F400 w/341 microservos

Speed control used: Novak Arrow Megafet for airplanes

Battery used: SR Max Pack with 7 cells, 1800mAh capacity

Construction: foam-core wing with factory-bonded composite skin and injection-molded polypropylene fuselage

Part no: KYOA1071

List price: $199.99

Features: quick assembly, Mabuchi 550SH direct-drive motor with folding propeller, lightweight polypropylene and foam construction, light, strong and seamless (LSS) one-piece fuselage, complete hardware package that includes motor, manual with addendum.

Comments: another version of the glider, the Stratus Sport, is available. It has polyhedral wings and no ailerons (KYOA1070).

Hits

• All control surfaces are pre-hinged.

• Motor and battery combination allowed four to five climbs to altitude per charge.

• Model can be transported in one piece.

• Colorful graphics.

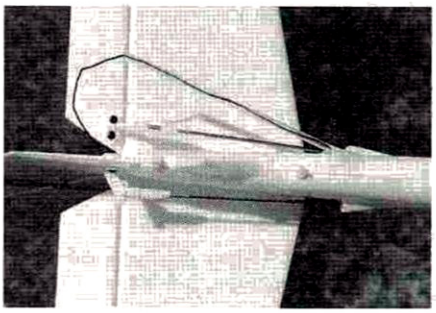
Misses

• Plastic housing for the wing-bolt nuts doesn't adhere well to the plastic fuse.

edges of surfaces that are to be joined together. I had to clean it off the bottom of the vertical fin for a tighter joint between the fin and the horizontal tail top surface, and I had to cut away some of the back of the fuselage to allow the rudder to have uninhibited movement.

GO THERMAL

It should take about two days to complete your glider. If you read the addendum sheet before you use the manual, you'll save



A bottom view of the tail feathers and their pushrod connections. The antenna tube and antenna are above the elevator pushrod.

yourself some work. Once the glider has been assembled, check the CG and the control-surface movement, charge the batteries and go thermal. One day, I caught a thermal with the Soarus Sport and had it so high up that its white finish kept blending with the clouds. I lost sight of it a couple of times and had to spin it down to regain visual contact. This is a great thermaller, and you'll enjoy it immensely.

**Addresses are listed alphabetically in the Index of Manufacturers on page 151.*

FLIGHT PERFORMANCE

• Takeoff and landing

Because this glider weighs 50 ounces, I hand-launched it with the motor running. When there's no wind or gusts, the climb-out is very smooth. I found that the Soarus flies better and recovers faster when you use the rudder. The ailerons will turn it, but you'll achieve a smoother turn with rudder coordination.

Once I reached thermalling altitude, I cut the motor and added up-trim to prevent the glider from descending too rapidly. No aileron trim was necessary. Because the Novak Arrow speed control has no braking action, I pulled back on the elevator stick, and the resultant higher angle of attack stopped the prop from windmilling.

Landing the Soarus is easy; just line up with the runway and control the speed of the approach with pitch. Save a little extra battery power for the motor just in case you have to go around. I found the Soarus will glide for a long distance before settling in, and the elevator is sensitive enough so that a little input on the glide path will extend the landing distance considerably. The SR* 7-cell 1800mAh battery pack provided five solid motor runs up to thermalling altitude.

• Low-speed performance

This consisted of chopping the throttle, adding up-trim and floating from thermal to thermal. In a stiff wind, the Soarus will almost hover without losing too much altitude. At low angles of attack, the break of the power-off stall was moderately sharp. Recovery consisted of neutralizing the elevator and adding a little power. All wing-dropping tendencies were corrected with the appropriate rudder input. Because it has a high-aspect-ratio wing, the Soarus's aileron response at low airspeeds is a bit sluggish; elevator and rudder responses are fine.

• High-speed performance

The kit included a Mabuchi 550SH, which, along with the SR 1800mAh Max 7-cell pack I used, provided sufficient thrust to take the Soarus to thermalling altitudes. However, if you want high speeds, gain some altitude and turn downwind. Diving with the throttle cut provided high speeds as well. For power-on stalls, the higher the angle of attack, the sharper the stall will be. Make sure you have plenty of altitude for this recovery.

• Aerobatics

To loop the Soarus, you'll need to dive for speed before pulling back on the stick. It will perform a combination spin/spiral when put in a spin, but the high-aspect-ratio wing will not allow a tight spin. Barrel rolls were achieved only when a dive for airspeed preceded them. The same goes for stall turns; dive the plane, pull back on the stick and when the plane is close to completing its vertical climb, kick it over with the rudder. The Soarus will fly inverted, but it needs quite a bit of forward stick to maintain this attitude.

All maneuvers can be flown with the power on or the power off. Inverted flight requires less forward stick when flying with full power.

MODEL AIRPLANE NEWS
HOW TO

Centrifugal Force and Maneuverability

by ANDY LENNON

In aerobatics, centrifugal force (CF) imposes both aerodynamic and structural loads on an airplane that may be many times the model's weight. It deserves serious consideration. CF acts at the plane's center of gravity (CG). The center of lift may be ahead of, on, or behind the CG in maneuvers.

■ If the center of lift is ahead of the CG, lift is upward; CF and weight pull downward at the CG. A force couple is created that causes the model to nose up, and this assists in the turn or climb.

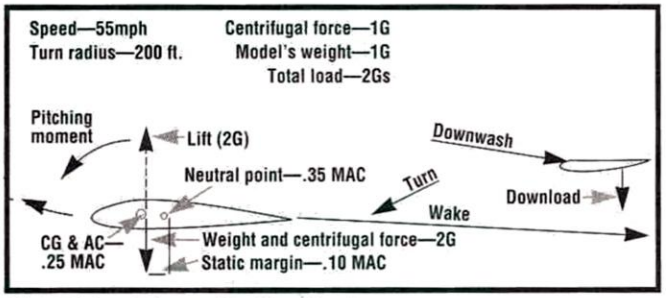


Figure 1. Loads in a vertical turn (loop).

■ If the center of lift is behind the CG, the force couple will cause the model to nose down and resist the maneuver.

■ If the center of lift and CG are vertically aligned, weight and CF are neutralized by lift and do not affect maneuverability.

This chapter describes the evaluation of CF and analyzes various center-of-lift/CG positions for conventional (tail-last), tandem-wing, canard and three-surface configurations.

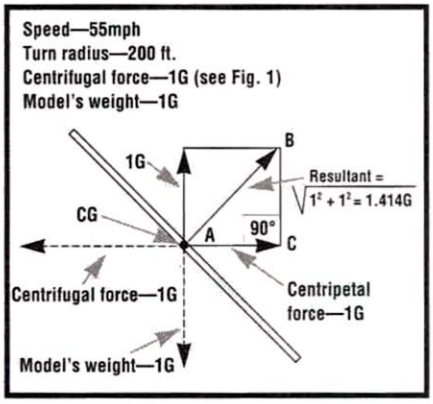


Figure 2. Loads in a horizontal turn.

CENTRIFUGAL FORCE EVALUATION

It's easy to evaluate the maneuvering loads brought about by CF. Two important maneuvers will be considered: turns in a vertical plane and turns in a horizontal plane. Most aerobatics involve a combination of these.

■ **Turns in a vertical plane**—a series of loops. The CF will be evaluated at the bottom of the loop where weight and CF act downward.

■ **Turns in a horizontal plane**—a steady, level, coordinated turn in which weight acts downward but CF acts horizontally.

VERTICAL MANEUVERS

Assume that a plane flying at 55mph is at the bottom of a continuing 200-foot-radius (400-foot diameter) loop (see Figure 1). The combined weight and CF total 2G's, or twice the model's weight, and this force acts at the model's CG. The increase in the load the wing must support is modest. Had the loop been flown at 90mph, with a 100-foot radius, the CF would have increased to 5.4G's, plus the model's 1G weight, for a total load of 6.4G's.

Referring to Figure 1, the resulting force changes are:

■ **Lift.** The wing's AoA and CL must increase to provide the additional lift needed.

■ **Drag.** Both profile drag and induced drag increase.

■ **Downwash.** The increased lift coefficient causes an increase in the downward deflection of the downwash striking either the horizontal tail or the aft wings of the tandem, canard, or three-surface configurations.

■ **Pitching moment** (PM). For cambered airfoils, the wing's PM may increase with increase in its angle of attack (AoA). The charts for the airfoils involved must be consulted.

■ **Thrust moment.** If the thrust line is above the CG, a nose-down moment results. If the thrust line passes through the CG, the result is neutral. If it is below the CG, a nose-up moment occurs.

■ **Drag moment.** If the center of lift is above the CG, the increased drag will cause a nose-up effect. If center of lift and CG coincide, the result is neutral. If the center of lift is below the CG, a nose-down action results.

■ **Maximum lift coefficient.** If the combined weight and CF in small-radius, high-speed turns exceeds the wing's maximum lift capacity, a high-speed stall will occur.

■ **Structure.** The model's structure must withstand the substantially increased load without failing.

HORIZONTAL TURNS

See Figure 2. With a plane flying at 55mph in a steady, level, coordinated, 200-foot-radius turn, CF acts horizontally; to provide lift to oppose it, the model must be banked as shown. But the wing's lift must also overcome the model's weight. As in Figure 1, line CF represents 1G, and it must be opposed by a centripetal force of 1G. This results in a force diagram that is solved by vector analysis. In Figure 2, line

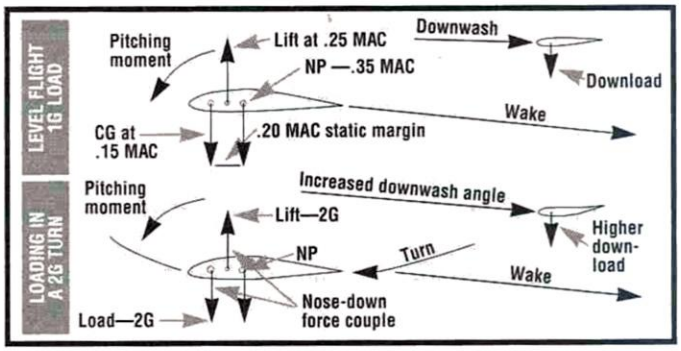


Figure 3. Forward CG loading in 2G turns.

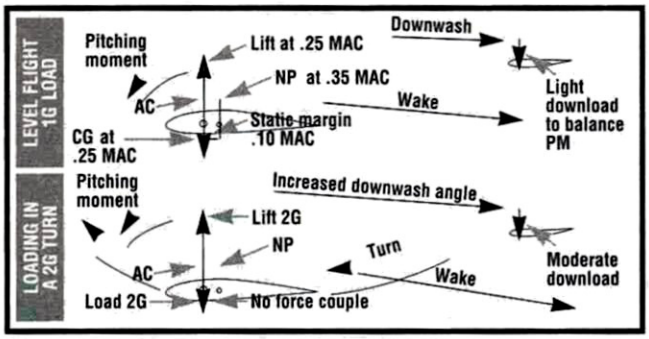


Figure 4. Loading with CG at .25 MAC in a 2G turn.

AC is the centripetal force of 1G and line BC is the model's weight of 1G.

ABC is a right-angle triangle in which our old friend, "the square of the hypotenuse is equal to the sum of the squares of the other two sides" applies. As Figure 2 shows, the result is 1.414G's, and the angle of bank is at 90 degrees to line AB.

Obviously, in terms of turn radii and speeds, the horizontal turn is less demanding than the vertical turn. These comments on lift, drag, etc., for vertical turns, however, do apply to horizontal turns.

CG LOCATION

Figures 3 through 9 illustrate seven possible stable CG locations.

Figures 3, 4 and 5 are for conventional airplanes where only the wing's lift supports the model; the horizontal tail controls the wing's AoA and compensates for moments caused by thrust, drag, pitch and CG location.

Figures 6, 7, 8 and 9 display configurations in which two surfaces actively provide lift, share the model's weight and provide additional lift to overcome the various moments listed above.

Elevators for planes shown in Figures 3, 4 and 5 are on the horizontal tail's trailing edge. For the tandem wings shown in Figure 7, elevators may be on the trailing edges of either the fore or the aft wing.

Canard elevators are usually on the foreplane's trailing edge (Figure 8).

For the three-surface designs shown in Figure 9, the elevators are on the horizontal tail's trail-ing edge.

In all cases, the CG must be ahead of the neutral point (NP) for longitudinal stability.

Note the rearward shift of the CG from Figures 3 to 9 as the model's configurations change.

The following analyzes each configuration and its response to CF and other forces, both in level flight and under a 2G load.

■ Forward CG. The CG is at 15 percent of the wing's MAC, ahead of the wing's aerodynamic center of lift, which is at 25 percent MAC. The generous static margin of 20 percent MAC ensures that the model will be easy to fly and very stable longitudinally. In maneuvers, however, a force couple is created; CF and weight acting at the CG pull downward; wing lift at the aerodynamic center pulls upward; both cause the airplane to move away from the loop or turn, resisting the maneuver.

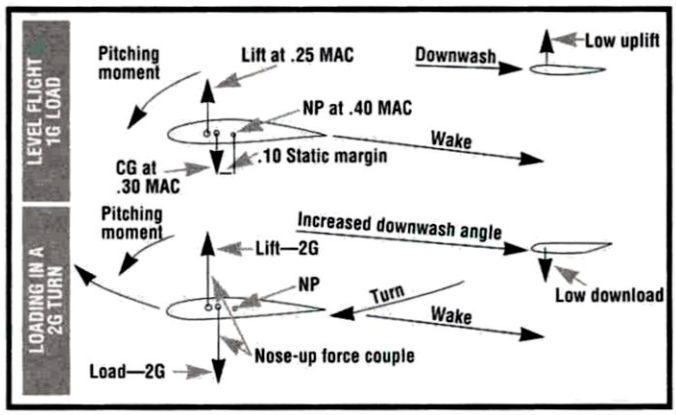


Figure 5. CG aft of .25 MAC loading in a 2G turn.

A substantial increase in tail download is required to overcome this. Elevators whose area is 40 percent of the total horizontal tail area will have adequate authority, but at high CF values, they simply can't provide adequate download, and the tail stalls. This limits the model's high-speed, low-radius turning capability and its maneuverability.

The increase in the downward deflection of the downwash striking the horizontal tail does assist, but this brings the tail closer to its stalling angle.

■ CG on the aerodynamic center (Figure 4). The wing's lift, at its aerodynamic center, is vertically in line with the CG. In turns, CF neither adds to nor reduces the horizontal tail's load.

If the wing's airfoil is cambered, the tail must compensate for the nose-down pitching moment. If it is symmetrical, there is no pitching moment; this increases the horizontal tail's effectiveness. The increase in the downwash angle that results from the wing's increased lift coefficient aids the maneuver.

Elevators of 30 percent of the horizontal-tail area are suggested. The Swift typifies this arrangement.

■ CG aft of the aerodynamic center (Figure 5). In this configuration, the CG is slightly behind the wing's aerodynamic center at the 25 percent MAC location by 2 to 5 percent MAC. A modest increase in the horizontal tail's area of 3 to 5 percent of the wing's area will move the neutral point aft and maintain a healthy static margin of 10 percent MAC.

Under CF loads, the force couple is upward at the aerodynamic center and downward at the CG behind the aerodynamic center, and that helps the elevator action (as does the increase in downwash deflection). An elevator area of 25 percent of the horizontal-tail area is adequate.

LIFTING TAILS

See Figure 6. This type could almost be classified as a tandem-wing model; both wing and horizontal tail share in lifting the model's weight and in compensating for the various moments. It's an old free-flight setup, typified by the late Carl Goldberg's classic Comet design and advocated by H. deBolt.

The lifting tail has a flat-bottom airfoil and is 35 to 40 percent MAC of the wing in area. This moves the NP aft to 45 percent MAC, permitting a CG at 35 percent MAC, well behind the wing's aerodynamic

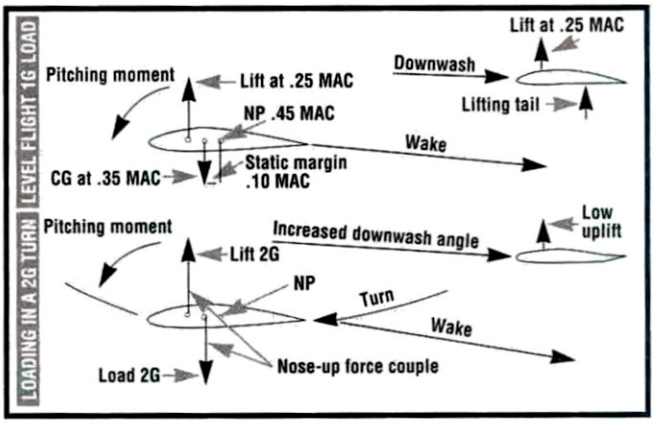


Figure 6. Lifting tail load in a 2G turn.

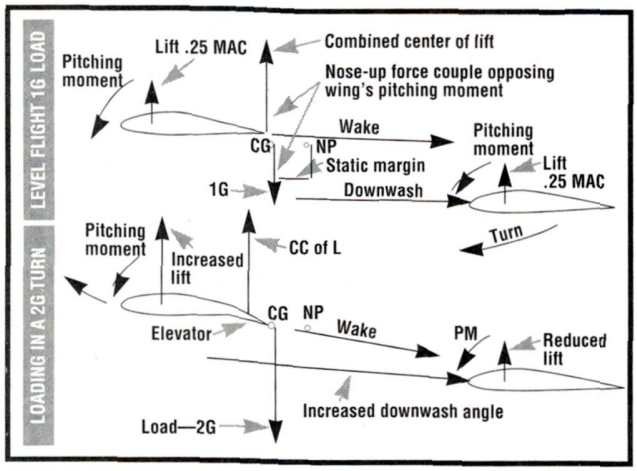


Figure 7. Tandem-wing loading in a 2G turn.

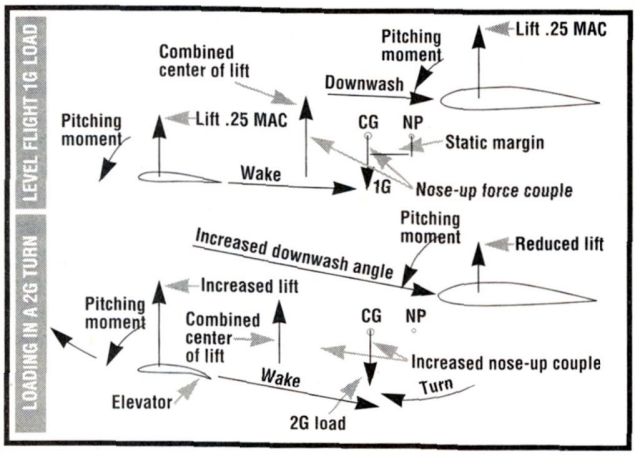


Figure 8. Canard loading in a 2G turn.

center at 25 percent MAC, but provides a healthy static margin of 10 percent MAC.

Up-elevator reduces the tail's upward lift. CF acting at the CG is behind the center of lift, and the resulting strong force couple actively assists up-elevator action, as does the increased angle of downwash. An elevator area of 20 percent of the horizontal tail is adequate.

The configuration is unsuitable for a model equipped with flaps on the wing. Fully ex-tended, the flaps would:

- Substantially increase the wing's lift and lift coefficient.
- Sharply in-crease the down-ward angle of the downwash striking the horizontal tail, reducing its lift or reversing it to downlift.
- Move the combined center of lift of the wing and tail forward.
- Increase the moment arm between this combined center of lift and the CG, augmenting the nose-up force.

The combination of in-creased wing lift, reduced or reversed tail lift and the increased force couple between center of lift and CG would render the airplane dangerously unstable in pitch when the flaps were extended.

TANDEM WINGS

See Figure 7. This configuration is shown in the Wasp. Both wings share the lift to support the model, plus additional foreplane lift to compensate for the nose-down pitching moments of both wings' cambered airfoils. The combined center of lift of the two wings is thus ahead of the CG. Application of down-elevator on the foreplane does two things: it increases the foreplane's lift, and the downward angle of the downwash reduces the aft wing's lift. Both act to move the combined center of lift farther forward.

CF acting at the CG aft of this combined center of lift greatly aids the maneuver. In retrospect, the moment arm from CG forward to the foreplane's 25 percent MAC is short. A better option would have been to place smaller elevators on the aft wing's trailing edge, between the vertical surfaces, with ailerons on the foreplane. Flaps, if used, would be required for both wings.

CANARDS

See Figure 8. Like in the tandem-wing version, the foreplane must lift its share of the model's weight, plus provide additional lift to offset the cambered airfoils' pitching moments; this puts the combined center of lift ahead of the CG. Since the distance from CG to foreplane AC is greater than for the tandem type, the canard foreplane's pitching-moment load is less than for the tandem foreplane.

Depressing the foreplane's elevators increases its lift and increases the downwash deflection; this reduces the rear plane's lift in the portion "shadowed" by the front wing. Both move the combined center of lift forward. Under CF, a greater nose-up force couple results, and this helps with the maneuver.

The Canada Goose and the Swan had slotted flaps on both fore and aft wings.

THREE-SURFACE DESIGNS

See Figure 9. The Wild Goose shown in the photos illustrates this design. The horizontal tail controls pitch, and both wings have slotted slaps for slower landings. The tail's area moves the neutral point aft, and that permits the CG to move aft as well.

The closer spacing (longitudinally) of the wings results in a short moment arm from CG to foreplane AC. This results in a higher load on the foreplane to over

(Continued on page 161.)

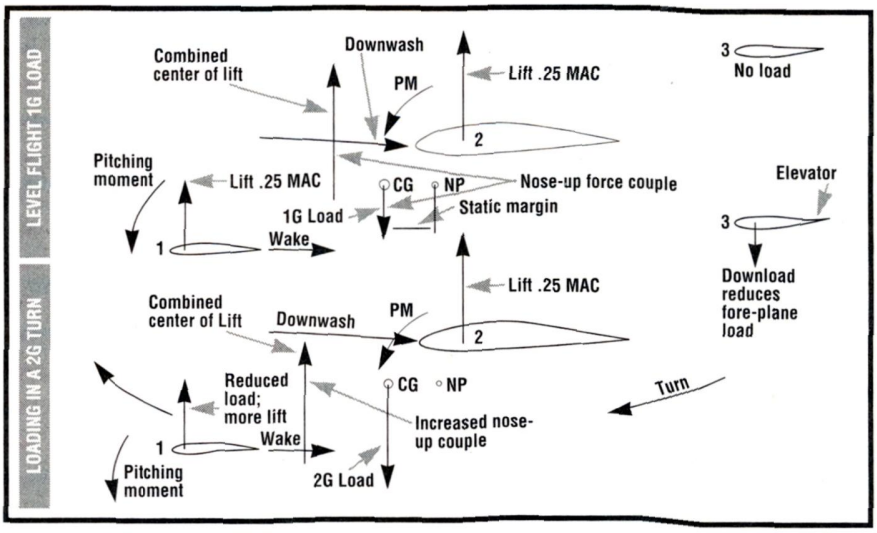


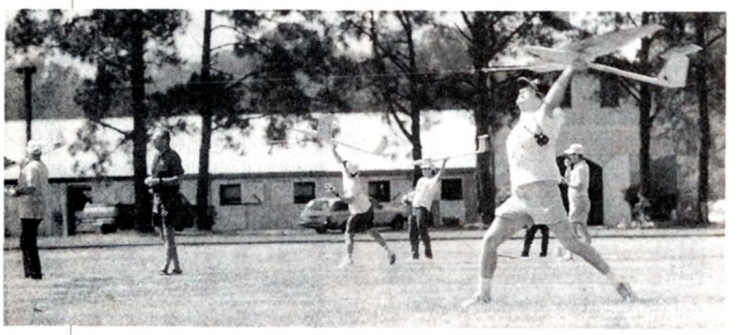
Figure 9. Three-surface loading in a 2G turn.

Center ON LIFT

by MIKE LACHOWSKI

F3J—THERMAL DURATION COMPETITION

THE FIRST world championships for F3J will be held in England in 1998. The current proposal is to select the U.S. team members at an extended F3J event at the '97 Nats. Instead of one day of flying, there will be two, during which the top 15 to 20 pilots will be chosen. The team will be chosen from these pilots, who will fly on the third day.



The launch areas are busy, and tow men usually start their run a few seconds before the start so that the pilot can launch as close to the start time as possible.

F3J is a thermal duration event that requires hand-tow launches, i.e., no winches or other complicated equipment can be used. Scoring is man-on-man, and this is important because all the pilots in a flight group must launch and fly within a 10-minute window. The maximum possible flight time is just under 10 minutes. The landing spot is a graduated FAI tape, and 5 points are subtracted for each meter that a plane lands away from the "bull's-eye." If you land after the 10-minute mark has passed, you are penalized 50 points. If you think these landings are easy, think again: you can't use skegs or teeth. All landings must be within the landing area; otherwise, the flight points won't count. (Pilots can't take weak lift far downwind and not return near the contest area.)

One final twist: the top competitors from the preliminary rounds compete in two fly-off rounds for first place. These rounds are each 15 minutes long.

THE LAUNCH

The launch line is 150 meters long, and launch height is lower than those of the winch launches at most AMA duration contests. Most pilots use monofilament line for launches. This line has some stretch, and this allows a zoom launch. The model's weight and the wind will determine how strong a line you need. You can easily launch a lightweight floater on 60-pound test line; if you want to launch a strong unlimited ship in strong winds with a big tow man, you may need 150-pound test or possibly 200-pound test.

In light wind, you may want to use a pulley tow: stake the end of the line to the ground, and the tow man must run with a pulley. The pulley tow doubles the line's speed and is extremely useful in light winds and calm conditions. The line length is reduced by this type of tow, but the extra line speed and shorter launch time make up for this loss. Because the line stretches, the tow man must run for a short time (usually around 3 seconds) before he releases the model. If you're trying to get the maximum flying time, have the tow man start running 3 seconds *before* the start of the working time.

You are permitted two launches during working time. If your first launch is a pop-off or you launch into bad air, you can land and relaunch. Although this takes time, you may be able to get to better air. Relaunch strategy is also important. Ideally, you should have a primary launch towline and a ready-to-use relaunch towline. The tow man should also be prepared for a relaunch. You should continue running with the launch line after launch to make sure the first line will be clear of the second. Extra towlines don't improve launch height. A hand winch is useful for quickly winding up the line and clearing the launch area.

It's not difficult to hand tow in a breeze. Almost anyone can do it, but be careful if the tow man is too light; you might lift him off the ground! Don't forget to wear proper footwear, especially when you tow on wet grass.

THERMAL STRATEGY

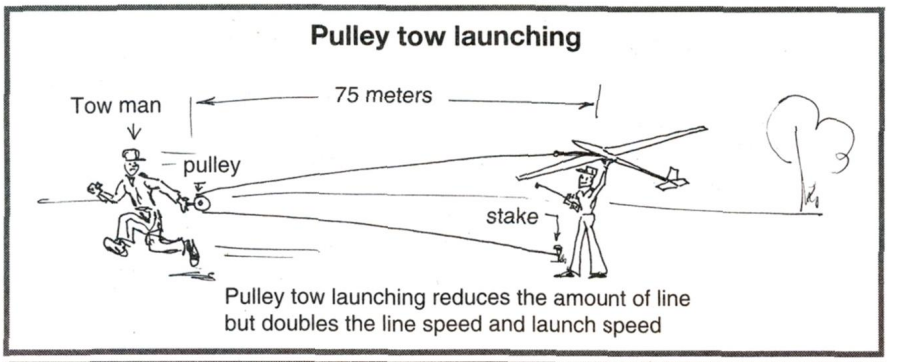
When thermals are popping, deciding when to launch is easy. You should launch early and quickly to get the most

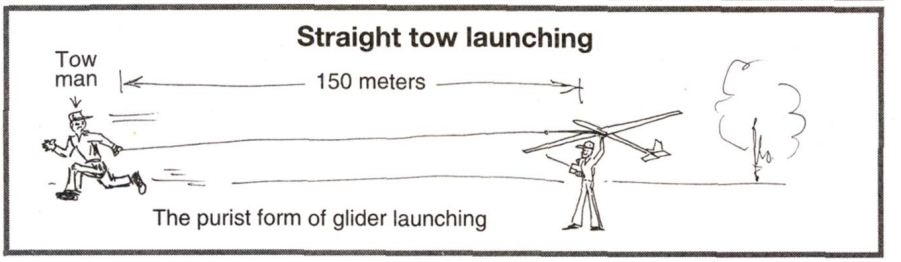
SOARING EXCHANGE

More than 1,000 soaring pilots worldwide now subscribe to the Radio Control Soaring Exchange (RCSE) to stay up to date and bounce ideas off others in the soaring community. Many posts find their way into club newsletters. (Of course, as a newsletter editor for the Eastern Soaring League and past club newsletter editor, I find it baffling that some people write so much online but can never come up with a newsletter contribution!)

I met several RCSE members at this year's League of Silent Flight Nats. There were even special nametags for RCSE pilots. A whole new batch of pilots subscribed after hearing about RCSE at the Nats. Some of these folks are addicted to this medium: if they don't see 20 messages a day, they get worried. Most readers just lurk and subscribe to the digest version of RCSE that packages a bunch of messages into one large daily message. A very large soaring FAQ (frequently asked questions) is also edited and posted to the list by Murray Lane.

To subscribe to the Soaring Exchange, send an email to soaring-request@airage.com. To subscribe to the digest version, send an email to soaring-digest-request@airage.com. You can receive additional information by including "help" in the message.





flying time possible. If you're flying in the early morning, in the evening, or in bad conditions, you need a better strategy. If there isn't enough lift to provide 10 minutes of flight time, it might be better to wait until others have launched. You can watch the other models to see where the best—and worst—air is located. If you avoid the worst air, you might be able to glide longer than the others in your flight group.

You may not want to circle in lift either, because that's an obvious sign that you are in lift. (Of course, you can circle in sink to draw other competitors to bad air, too.) Stay near the lift, keep track of the edge until the others can't get to the air and then work the lift harder.

At F3J, it's common for everyone to launch at once. Should you stay with the pack or run for some lift? If your launch as good or better than everyone else's, staying with the pack might be good—if everyone stays together. You need extra height to acheive the longest flight. When planes are scattered all over the sky, it's time to find and work the lift. You can't depend on outgliding everyone else.

PLANE STRATEGY

You can use two models in an F3J contest. Unlike AMA events in which you have to stick with your primary model, F3J allows you to change at any time. Early morning and fly-off rounds might be just the occasion for a model that's larger than the typical AMA thermal duration plane. In some conditions, simple 2-channel floaters are competitive in for short-tow and 10-minute duration events, and windy conditions and stronger lift are good for F3B-style models. These models can be launched hard in wind and can get up the line quickly.

TEAMWORK COUNTS

Up to three people (including the towman) can assist the pilot. Spotters are invaluable for keeping track of the competition in the flight group. Although the best pilots may make the best spotters, you run into one problem: what happens if you all make the fly-off? Help you can count on is important.

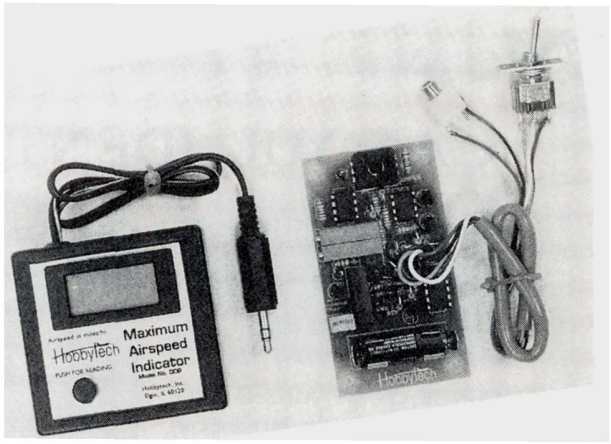
So, what do you need to succeed in F3J? Two models, two or three towlines, a hand pulley and a stake. Anything else? Practice, practice, practice.

In F3J, up to three people can help you (including the tow man). A spotter can help you get an edge on the competition.

MODEL AIRPLANE NEWS

PRODUCT REVIEW

A fast and accurate unit



Hobbytech's Maximum Airspeed Indicator weighs only 3 ounces and is easy to install and use.

HOBBYTECH

Maximum Airspeed Indicator

by ANDY LENNON

FOR MANY YEARS, this author has sought an inexpensive, easily installed and easy-to-use device that will provide accurate airspeed data to confirm visual observations of good performance. Hobbytech's* Maximum Airspeed Indicator fills these requirements ideally.

Hobbytech provides an excellent instruction manual and, once installed, the unit is easy to use. You need only to switch the unit on, fly the model and land it. Then use Hobbytech's optional digital readout device (which is plugged into the readout jack) to see an instant digital display in miles per hour. The digital readout device is so convenient that it is well worth the cost.

Alternatively, you can use a digital voltmeter (plugged into the readout jack) capable of two decimal places and obtain a voltage reading that you can convert to mph using a conversion chart supplied by Hobbytech.

The test model—the Swift—has a 600-square-inch wing area, it weighs 96 ounces (gross), and it's powered by an O.S.* Max 46 SF ringed piston engine. The Swift consumes Omega* 10-percent-nitro and spins an APC* 10x9-inch prop in the static range of 12,000rpm. Its airspeed was a surprising and pleasing 138mph.

INSTALLATION

Despite its low 3-ounce weight, the unit should be located on or close to the model's CG to avoid upsetting balance.

On the high- or low-winged versions, there is room in the fuselage to install the Airspeed Indicator. Hobbytech supplies a small, neat, O-ring-sealed connector to couple the in-wing flexible tubing to the smaller tubing leading to the unit. This permits easy wing installation and removal.

For mid- or shoulder-wing models, the unit may be mounted directly on the wing, and this will avoid the use of the connector.

In the Swift, the unit was mounted on the wing's center-section spars. Both the on/off switch and the readout jack were located on a small, plywood shelf so that the switch lever projected through a tiny hole in the canopy. Another hole over the jack permitted readings to be taken without removing the canopy.

The Pitot tube and its flexible tubing is easiest to install during wing construction. For the Swift, a 1¾x10-inch "D" section of the right-hand wing's leading edge was carefully cut out, the tubing was installed and the section was cemented back in place. MonoKote* covered the small seams.

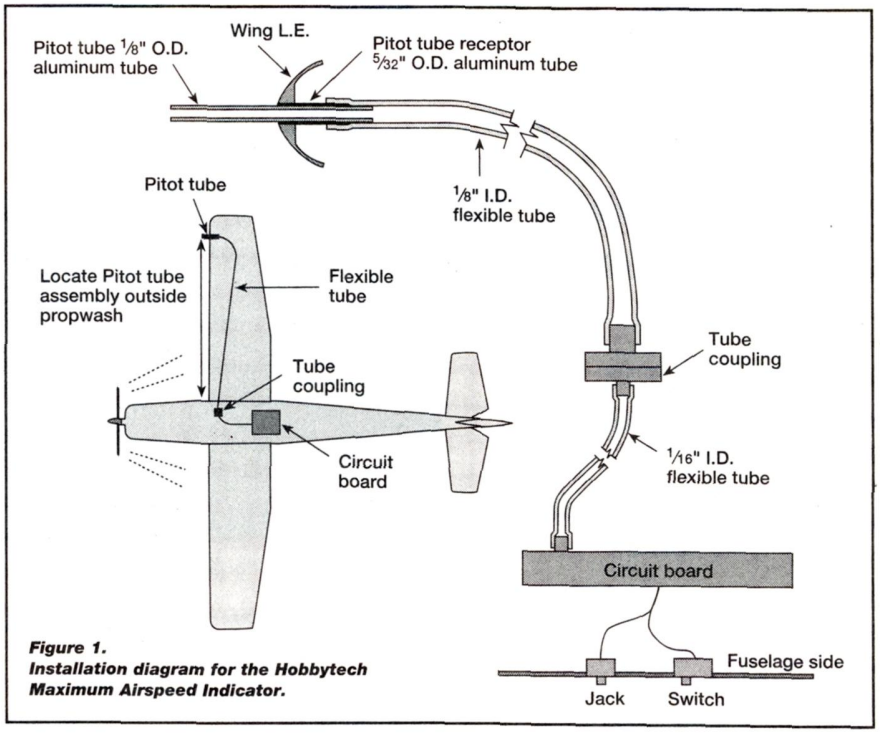


Figure 1.
Installation diagram for the Hobbytech Maximum Airspeed Indicator.

SPECIFICATIONS

Dimensions: 3x1.75 in.

Weight (w/battery): 3 oz.

Power: 12V miniature battery

Range: 0 to 250mph

Accuracy: +/- 2mph between 0 and 150mph; +/- 1mph over 150mph

Repeatability: +/- 0.2%

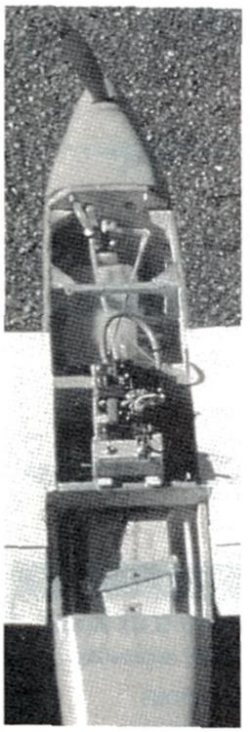
Part nos.: MAI-A; optional digital readout device—DDR

Price: $109; $69

Features: this onboard airspeed indicator measures the highest airspeed achieved by your model during flight and reports the information after landing. Simply plug in your digital voltmeter, and use the provided chart to convert your voltage reading to mph.

FINAL THOUGHTS

I highly recommend the Hobbytech Maximum Airspeed Indicator to model airplane enthusiasts who are interested in improving their model's performance through good propeller selection and the application of the performance-engaging and drag-reduction suggestions in this author's series of "How-To" and construction articles in *Model Airplane News*.



Hobbytech's Maximum Airspeed Indicator is mounted on the Swift's wing center-section spars.

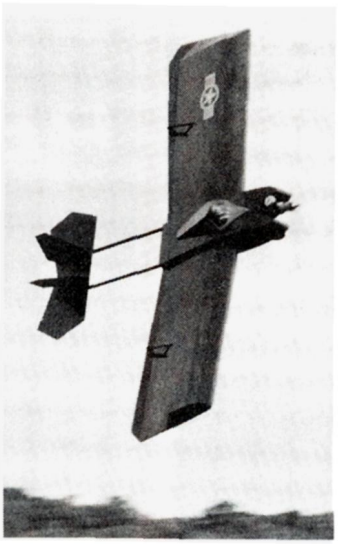
This unit is very well-conceived and it includes excellent instructions. Installation is not difficult, and with the optional digital readout device, the unit is very easy to use. It is a high-quality product. My thanks to Ken Starkey for expertly piloting the Swift in the time trials.

**Addresses are listed alphabetically in the Index of Manufacturers on page 151.*

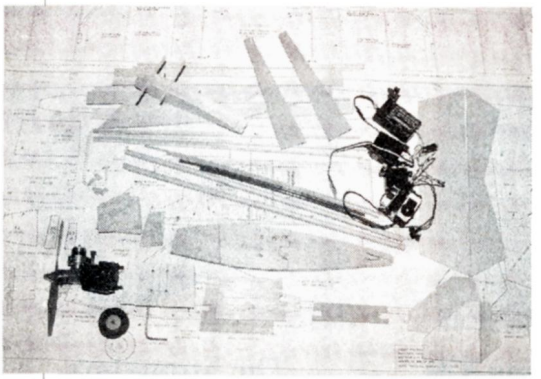
Scratch-Builders' **CORNER**

by GEORGE WILSON JR.

CONSTRUCTION NOTES FOR 1/2A STEALTH SPORT



WHEN IT crossed my desk, a brochure on the House of Balsa* 1/2A Stealth Sport kit immediately drew my interest. With a little research, I found that before the plane was kitted by House of Balsa, it was featured in a construction article by Joe Lukins in the October 1993 issue of *Model Airplane News*. The Stealth Sport (FSP10931) has an intriguing configuration, and its special aerodynamics prompted test pilot Dave Baron to give it a strong endorsement. It's a natural for the scratch-builder who is on a budget or flies from a small field.



Here's my "kit" for the Stealth. The engine and R/C equipment are shown, and a number of the subassemblies have already been constructed.

SCRATCHING THE STEALTH

My version of the Stealth weighs in at 18 ounces (like Joe Lukins' original) and has an added servo for throttle control. I used three microservos; the original used two midget servos without throttle control.

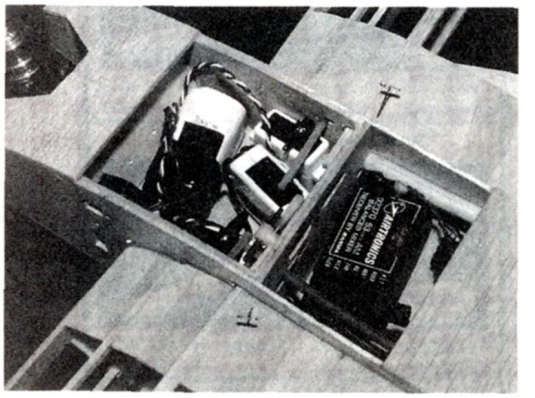
Construction is simple because of Joe's design. Many things are "self jigging," including the dihedral angle and tail booms. Even if you build the kit, it would be well to find a copy of the construction article to assist you. With a few exceptions, my Stealth closely follows the article's plan. If you scratch-build your own, here are my suggestions. The plans call for 5/16-inch-diameter cedar dowel for the tail booms. Cedar dowel is not easy to find. Luckily, I have dowel-making tools for my lathe, so I made my own dowels. A wooden arrow shaft is a good substitute if you use one of the lightweight ones found at most sporting-goods stores. Hollow fiberglass arrow shafts would also be good and have the advantage of acting as conductors for the elevator control rod and the antenna.

When you build the wings, pin them to your workboard, and do not forget to put a piece of 1/4-square-inch balsa under the trailing edge (TE) to elevate it during construction. Eighth-inch-thick ribs at the wingtips will make covering the tips easier. I like to rough-shape leading edges (LE) with a power saw; a bench saw, band saw or jigsaw will also do. Cut away the excess wood using a fence to guide the work. Do the final shaping with a small (block) plane and/or sandpaper. The Master Airscrew* plane works well.

CONTROL SURFACES

I made the control-surface hinges as part of the Micafilm (made by Coverite*) covering. They are at the top surfaces of the wing and horizontal stabilizer. Another of the plastic iron-on coverings would probably do, but Micafilm is very strong, light and puncture- and tear-resistant. A little heat easily pulls dings out of it. I sanded the TE edges of the wing and horizontal stabilizer and the LE edges of the ailerons and elevator to allow the control surfaces to move downward easily. (Cover the bottom first.)

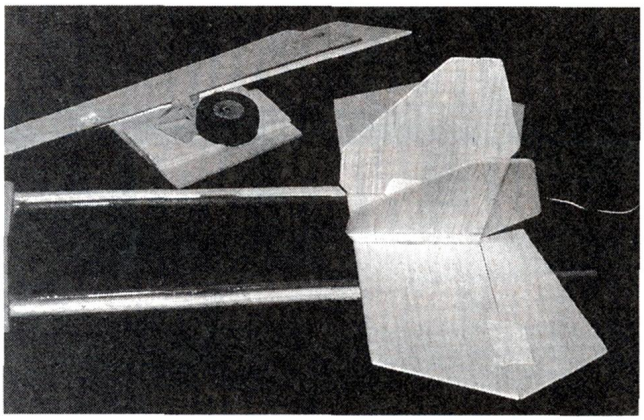
Lay the control surface upside-down on the top of the wing/horizontal stabilizer. Cover its bottom surface. Attach the covering to the back edge of the wing, the front edge of the aileron and the bottom of the control surface. Then move the control surface to its full-down position and cover the top of the wing and aileron. Cover the stabilizer/elevator the same way. This method of hinging provides totally sealed hinge lines and, consequently, more effective and efficient control action. It has been used on models through .40 size without difficulty.



In this photo, the R/C equipment has been mounted for trial balancing. The finished Stealth needed a 3/8x5/8-inch piece of lead flashing mounted with double-sided tape at the tail end. Note that the fuselage top sheeting has not yet been added.

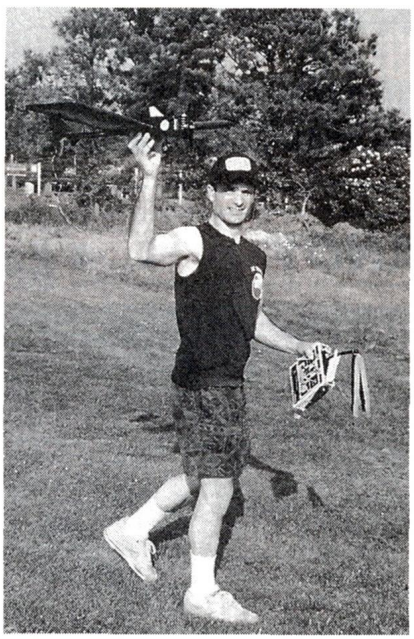
RADIO INSTALLATION

The servos, receiver, battery and switch harness should be mounted before the fuselage top is added. The top hatch is great for its intended maintenance purposes, but it is much easier to mount the R/C equipment



The tail structure trial-fitted. The alignment tabs shown on the plans for the vertical fins were not used. In their place, triangular support pieces were used.

while the fuselage is open. Fitting the battery and servos into the front compartment is a neat puzzle that has several solutions, depending on the servos and the mechanical connectors that you choose. Z-bends work well for the elevator and throttle. My aileron connector is a Goldberg* aileron coupler, but a double-ended ball link from Du-Bro* should work fine. Alternatively, in true scratch-building style, Cory Young's aileron drive system—described in Jim Newman's "Hints and Kinks" column in the July 1996 *Model Airplane News*—can be used.



Test pilot Will Sgarlat (our resident ½A specialist) about to hand-launch the Stealth. With the Cox Dragonfly engine revving at top speed, a hand-launch is more like having the model fly out of your hand. Bright strips on the bottoms of the wing were suggested to help the pilot see which side is up.

The nose wheel is a piece of pine cut out with a hole saw, a lathe, or a drill press. A piece of ¼-inch dowel is used as the hub. The tire is a piece of foam pipe insulation epoxied to the hub. Check to see that the foam you use for the tire is the closed-cell type. If it isn't, it will soak up fuel and become a soggy mess. I built this nose wheel as described in Randy Randolph's book, "R/C Airplane Building Techniques," published by Air Age Inc.

FINISHING

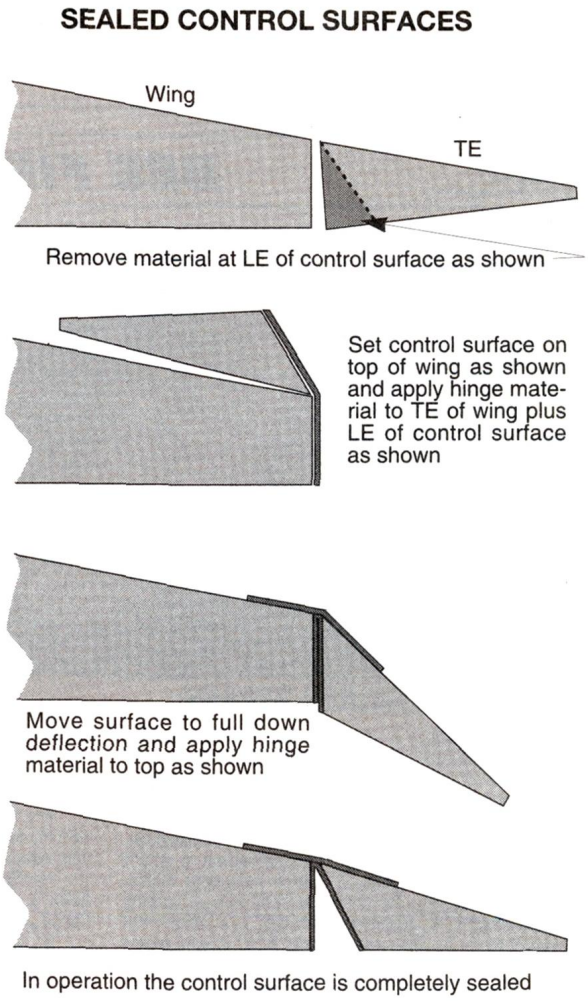
When the R/C equipment has been installed and the fuselage top sheeting has been added, the canopy should be built. The plan is not explicit about this feature, but it is easy to ad-lib the design and scratch-build it. After you have added the canopy, cut the hatch from the fuselage top sheeting. My windshield is clear MonoKote*—a neat trick I learned from Andy Clancy (Clancy Aviation*) when he built his Lazy Bee.

I finished the Stealth fuselage with butyrate dope. I used one coat of black over three coats of clear diluted 1:1 with thinner. I used two coats of clear (diluted 1:1) to finish it. Bear in mind that butyrate is not instantly fuelproof. Let it cure for several days to ensure that it will withstand fuel. I covered the flying surfaces with dark blue Micafilm. After seeing the Stealth fly, my critics at the flying field said that I should add bright strips to the bottoms of the wings to help me see which side is up. I did add yellow strips, and they did help.

PERFORMANCE

The ½A Cox* Dragonfly runs very well on 15-percent-nitro fuel. It throttles reliably from 5,000 to 12,000rpm. At 5,000rpm, the Stealth slows and handles well and is easy to land. The two-part article on Cox engines in the June/July 1996 issue of *Model Aviation* is recommended reading for anyone who uses Cox engines. The article was written by a knowledgeable Cox employee, Larry Renger, and it covers everything from break-in to hop-up. Larry suggests that you start the Dragonfly with the muffler wide open and prime it via the intake venturi. The muffler makes exhaust priming difficult.

My test pilot was Will Sgarlat, our local ½A expert. I set the throws as



suggested on the plans, and my Stealth flew just as Dave Baron's did. The variable engine speed makes it even more fun. At top speed, it climbs and maneuvers like a .40-powered sport model. At moderate speeds, it is easy to fly. Will said I'd be able to fly it, and I did. I have not flown aerobatics other than the basic maneuvers, but the Stealth tempts me.

EPILOGUE

The trend in R/C model airplanes seems to be "big is better." But big planes cost more and are noisier, among other things. They are not for entry-level fliers. Without a good instructor, a novice would find a .40-powered airplane difficult to handle; ¼- or giant-scale planes can be even more of a problem.

This version of the Stealth Sport is docile enough to be a trainer. It is inexpensive to build (except for the microservos) and operate (minimal fuel consumption). The Stealth flies well in 10mph winds. (Will Sgarlat flies it in any wind that a .40 can handle.)

In the August issue of *Model Airplane News*, in his "Golden Age of R/C" column, Hal deBolt showed Frank Hasty's half-size version of my Live Wire trainer revival (*Model Airplane News*, December '95). There must be many other candidates for ½A trainer designation. Novices may be scared away by the current, expensive, high-powered trainers. Perhaps we have overlooked the ½A class as a source of trainers that are just right for novices. The House of Balsa ½A Stealth Sport kit is a good choice, but for the scratch-builder, it's nice that there are plans available as well.

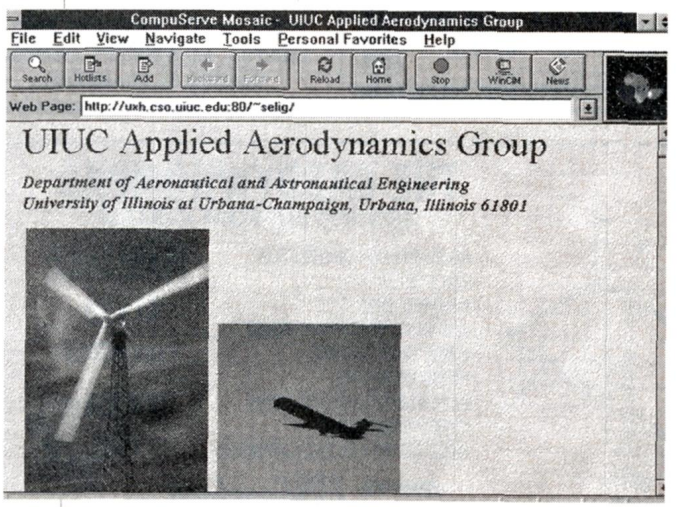
**Addresses are listed alphabetically in the Index of Manufacturers on page 151.*

R/C CYBERNEWS

by BILL GRIGGS

COMPUTERS—A NEW DIMENSION IN MODELING

FOR NEARLY 13 YEARS, I've been using computers to help me with my addiction to modeling. I first used a computer to write programs to help determine the CGs of canards. The project took weeks to complete and was a user-hostile nightmare. Back then, if you wanted a program, you had to write it yourself. Today, a large supply of commercial software helps to automate the modeling process. You'll find these useful:



- **computer-aided design (CAD) programs** that have revolutionized the drafting industry and have made manual drafting unattractive and inefficient;
- **scanning programs** that allow you to copy your favorite 3-view into a CAD program, then scale the drawing up or down;
- **airfoil-plotting software** that allow you to accurately reproduce wing cross-sections in any size and thickness;
- **flight simulators** that help you learn to fly and practice maneuvers (and stop crashing!);
- **wind-tunnel simulators** that help you to analyze flight performance *before* you build your design.

ONLINE MODELING

To get the most out of computer-aided modeling, you'll need a modem to allow you access to online tools. The Internet allows us to transfer information, data, photos and programs across the phone lines and into our computers. A modem (from "modulate, demodulate," for all you pocket-protector types!) converts computer data into sounds that are then transmitted over the phone lines to a remote computer. The remote computer's modem decodes those sounds into computer data.

If you don't already have a modem, consider buying one. It will allow you access to a wealth of information and people. For instance, have you ever wondered how large the engines are on the Boeing 777? Just go to the Boeing website.

Don't buy a modem that has a baud rate slower than 14,400. Baud rate is the measure of how fast the modem can transfer data. The higher the number, the faster the baud rate. The newest commonly available modems are 28,800 baud—theoretically, twice as fast as a 14,400 modem—and cost between $100 and $180. A 14,400 modem costs about $49. I feel it is worth the extra money to purchase a 28,800 modem because, with its greater speed, it will save you money on Internet charges.

DRAWINGBOARD REVISITED

In the August '96 issue of *Model Airplane News*, I reviewed Mid Columbia Engineering's* *DrawingBoard*—a CAD program with powerful features that modelers will love. One of its most flexible features is its ability to import or accept data in a variety of formats. I have a large library of R/C parts that I had drawn using *AutoCAD*, and I didn't want to have to redraw them. *DrawingBoard* is able to read data exchange format (DXF) files, so I quickly had all my servos and motors available for use in new drawings.

CAD programs allow you to draw detailed pictures, and you have to draw them only once; for example, you can make copies of a servo and try it out in different places in your drawing without the tedium of redrawing it each time.

Another really neat feature of *DrawingBoard* allows you to import text files (numbers and letters) that contain data for drawing geometrical figures into your drawings. The data can then be converted into a curved shape called a "spline"—a group of dots connected by a continuous curved line. I know you're thinking, "But what do I use it for?" Well, airfoils have curved tops and bottoms, so you could use splines to draw them. But how do you figure out where to draw the dots? You don't! Someone has already figured that out for you.

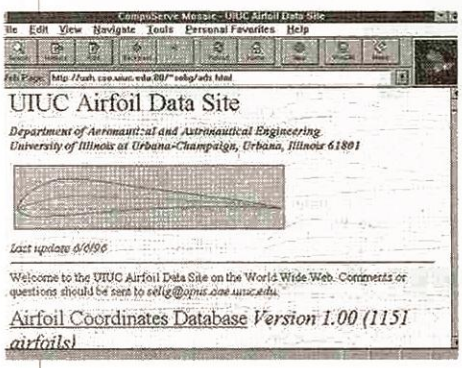
DrawingBoard requires all spline data to be in three-column (x, y, z) format, with each column separated by a space or tab. Any text-editor program will allow you to arrange the data. Once the data is in that format, it's a simple matter to select import from the file menu of *DrawingBoard*. Then set the data type to "text file." The program will ask whether you would like the data to be text or a spline. Select "spline," and sit back and watch as your airfoil is drawn automatically.

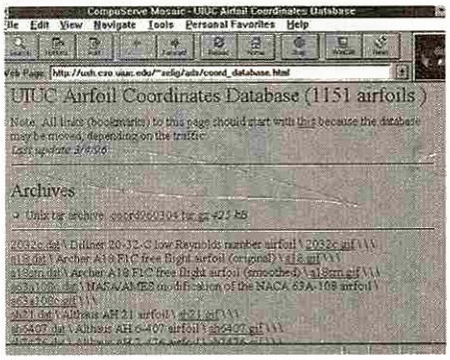
WEBSITE OF THE MONTH

In each column, I'll include a description of an R/C-related Internet site. This month's site is the University of Illinois at Urbana-Champaign (UIUC) Applied Aerodynamic Group homepage, where you have access to some of the world's foremost aerodynamicists. Michael Selig leads a group of students who conduct wind-tunnel tests on airfoils at low Reynolds numbers (the perfect range for most R/C models). They have made public their database of more than 1,100 airfoil

coordinates; it contains text as well as data files and pictorial representations for all these airfoils.

The UIUC site also contains a special program, *Profoil*, that lets you create airfoils and test them in a computer-simulated wind tunnel after you input a few numbers to describe an airfoil. You are not limited to creating your own airfoils.





To access this or any other website, you'll need an Internet service account and software that allows you to capture data from the screen. Most web-browser software is able to save data files from web pages so that it can be copied into word processor files. The edited data can then be thrown into a spline generating program to draw the airfoil. You must make sure the data is in the proper format for your drawing program. A format conversion is usually done manually. (If anyone knows of a program that will automatically convert the data into any of the standard spline formats please let me know, and I'll mention it in a future column.)

I use CompuServe *Mosaic* as my web-browser software. To get the data from UIUC, I first went to Internet address http://uxh.cso.uiuc.edu:80/ ~selig. Then I selected the hypertext link for the UIUC airfoil database (hypertext is a highlighted word that allows you to access the information on a web page). From there, it was a simple matter to locate the airfoil I wanted and call up the page with the coordinates. Then I selected "web-page source" from the file menu. This opened up a text only window, which I saved to the hard disk. (If you don't have a modem, you can order the airfoil coordinates on UIUC's website on disc for $15.)

THE FUTURE

I'd like your thoughts and questions on computer modeling; let me know what you'd like to see in this column. You can write to me c/o *Model Airplane News*; online at Griggsbill@AOL.COM; 1102341,2605 on CompuServe; and at my Speed 400 Racing homepage, http://ourworld.compuserve.com/homepages/griggsbill.

**Addresses are listed alphabetically in the Index of Manufacturers on page 151.*

INDEX OF MANUFACTURERS

22nd Century Aero Products, 2763 West Ave. L, Ste. 295, Lancaster, CA 93536; (805) 943-5394.

Ace R/C Inc., 116 W. 19th St., P. O. Box 472, Higginsville, MO 64037-0472; (816) 584-7121; fax (816) 584-7761.

Aeroglass R/C Flight Academy, 700 Meadow St., St. Michaels, MD 21663; (410) 820-6538.

The Aeroplane Works, 2134 Gilbride Rd., Martinsville, NJ 08836; (908) 356-8557.

Airtronics, 15311 Barranca Pky., Irvine, CA 92718; (714) 727-1474; fax (714) 727-1962.

APC Props; distributed by Landing Products, P.O. Box 938, Knights Landing, CA 95645; (916) 661-6515.

ASP; distributed by Hobby Lobby (see address below).

B&B Specialties, 14234 Cleveland Rd., Granger, IN 46530.

Badger Air-Brush Co., 9128 W. Belmont Ave., Franklin Park, IL 60131.

Balsa USA, P.O. Box 164, Marinette, WI 54143; (800) 225-7287; fax (906) 863-5878.

Bisson Custom Mufflers, RR 1 Taits Island, Box 32, Parry Sound, Ontario, Canada P2A 2W7; (705) 389-1156; (705) 389-1156.

Bob Dively Models, 38131 Airport Pky., #206, Willoughby, OH 44094; (216) 953-9254; fax (216) 953-9311.

Carl Goldberg Models, 4734 W. Chicago Ave., Chicago, IL 60651; (312) 626-9550.

Clancy Aviation, 219 W. 2nd Ave., Mesa, AZ 85210-1317; (602) 649-1534.

Coverite, 420 Babylon Rd., Horsham, PA 19044; (215) 672-6720; fax (215) 672-9801.

Cox Hobbies, 350 W. Rincon St., Corona CA 91720; (909) 278-7282.

Dremel Tool, 4915 21st St., Racine, WI 53406.

Du-Bro Products, P.O. Box 815, Wauconda, IL 60084; (847) 526-2136; fax (847) 526-1604.

F&M Enterprises, 22522 Auburn Dr., El Toro, CA 92630; (714) 583-1455; fax (714) 583-1455.

Global Hobbies, 10725 Ellis Ave., Fountain Valley, CA 92728-8610; (714) 963-0133; fax (714) 962-6452.

Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-1104.

Hangar 9; distributed by Horizon Hobby Distributors (see address below).

Hobbytech Inc., 34 Joslyn Dr., Elgin, IL 60120; (708) 695-5903; fax (708) 837-6235.

Hobby Lobby Intl., 5614 Franklin Pike Cir., Brentwood, TN 37027; (615) 373-1444; fax (615) 377-6948.

Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.

House of Balsa, 10101 Yucca Rd., Adelanto, CA 92301; (619) 246-6426.

IMP (Innovative Model Products), P.O. Box 333, Remsen, NY 13438-0333; (315) 831-2705; fax (315) 831-2805.

Ironwood Pacific, P.O. Box 1568, Lake Oswego, OR 97035; (503) 968-1330; fax (503) 968-1433.

JB Weld Co., P.O. Box 483, Sulphur Springs, TX 75482.

JR Remote Control; distributed by Horizon Hobby Distributors, (see address above).

K&S Engineering, 6917 W. 59th St., Chicago, IL 60638; (312) 586-8503.

Kyosho/Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-3630; fax (217) 398-0008.

LDM Industries Inc., P.O. Box 292396, Tampa, FL 33687-2396; (813) 991-4277; fax (813) 991-4810.

Loctite, 18731 Cranwood Ct., Cleveland, OH 44128.

Magnum; distributed by Global Hobbies (see address above).

Master Airscrew; distributed by WindsorPropellor Co., 3219 Monier Cir., Rancho Cordova, CA 95742; (916) 631-8385; fax (916) 631-8386.

M.D. Planes Inc., 22600 Lambert #D1009, Lake Forest, CA 92630.

Mid Columbia Engineering (MCE), 801 Pine St., Seattle, WA 98101; (206) 621-1988; fax (206) 382-9293.

Midwest Products, P.O. Box 564, Hobart, IN 46342-0564; (800) 348-3497.

Miller R/C Products, P.O. Box 425, Kenwood, CA 95452; (707) 833-5905; fax (707) 833-0059.

Moki; ditributed by Gerard Enterprises Inc., W226 N825 Eastmound Dr., Waukesha, WI 53186; (414) 521-0547; fax (414) 521-0551.

MonoKote; distributed by Great Planes Model Distributors (see address above).

Morris Hobbies, 1169 Eastern Pky., Louisville, KY 40217; (502) 451-6602.

Nick Ziroli Models, 29 Edgar Dr., Smithtown, NY 11787.

Novak Electronics Inc., 18910 Teller Ave., Irvine, CA 92612; (714) 833-8873; (714) 833-1631.

Oracover; distributed by Carl Goldberg Models (see address above).

O.S.; distributed by Great Planes Model Distributors (see address above).

Pacer Technology, 9420 Santa Anita Ave., Rancho Cucamonga, CA 91730.

Quadra-Aerrow Inc., P.O. Box 183, 1881 Rogers Rd., Perth, Ontario, Canada K7H 3E3.

Robart Mfg., P.O. Box 1247, 625 N. 12th St., St. Charles, IL 60174; (708) 584-7616; fax (708) 584-3712.

Sachs; distributed by Planes Plus, 5 S. 470-B Scots Dr., Naperville, IL 60563; (708) 416-6940.

Sig Mfg. Co. Inc., 401 S. Front St., Montezuma, IA 50171; (800) 247-5008 (order only); fax (515) 623-3922.

SR Batteries Inc., Box 287, Bellport, NY 11713; (516) 286-0079; fax (516) 286-0901.

Stay-Brite®; distributed by J.W. Harris Co. Inc, 10930 Deerfield Rd., Cincinnati, OH 45242; (513) 891-2000; fax (513) 891-2461.

Sullivan Products, P.O. Box 5166, Baltimore, MD 21224; (410) 732-3500; fax (410) 327-7443.

TAGS (Total Aero Graphic Services), 2787 Stage Center Dr., Memphis, TN 38134.

Top Flite; distributed by Great Planes Model Distributors (see address above).

Tru-Turn, P.O. Box 836, South Houston, TX 77587; (713) 943-1867.

Ultracote; distributed by Carl Goldberg Models (see address above).

Webra; distributed by Horizon Hobby Distributors, (see address above).

Williams Brothers, 181 Pawnee Street, San Marcos, CA 92069.

Zenoah; distributed by ISC Intl., 10620 N. College Ave., Indianapolis, IN 46280; (317) 844-1978.

CENTRIFUGAL FORCE AND MANEUVERABILITY

(Continued from page 118)

come the pitching moments of the two wings. The combined center of lift is thus ahead of the CG.

Up-elevator reduces the foreplane's load but does not reduce its lift. The combined center of lift moves forward; CF acting at the CG produces a nose-up force couple.

The combined elevator down-load and the reduced foreplane load are very effective in pitch. The elevators are *sensitive*; a ratio of 20 percent elevator area to total tail area is adequate.

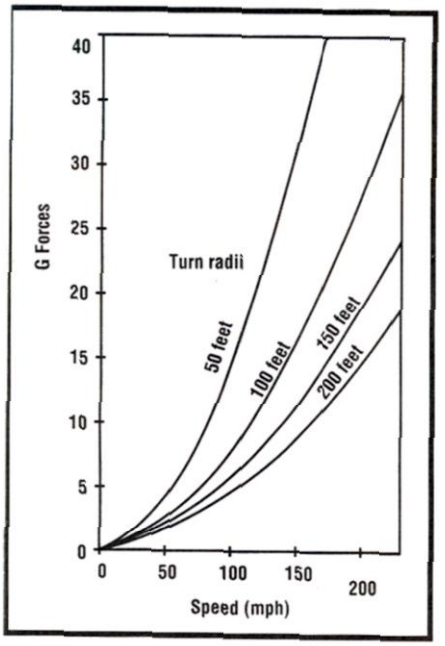


Figure 10. G forces in pulling out of a vertical dive at various speeds and turn radii, including model's' 1G weight. Example: at 100mph in a 100-foot turn radius, G forces are 7.7 times the model's weight.

INVERTED FLIGHT AND MANEUVERABILITY

Of the seven configurations discussed so far, only Figures 1, 2 and 3 will easily fly inverted. The rest rely on two wings for support. Inverted, these types would not satisfy the two critical requirements for longitudinal stability:

■ The foreplane must stall first.

■ The aft plane must achieve zero lift first.

For conventional tail-last types, optimum maneuverability is obtained by having a symmetrical airfoil and ensuring that thrust, drag and lift forces run through the CG. This arrangement neutralizes the disturbing moments and allows the tail full effectiveness, particularly if it is T-mounted.

Except for its airfoil, which is semisymmetrical, the Swift's design complies with these stipulations. ✈

LATEST PRODUCT RELEASES

DU-BRO PRODUCTS INC.

Wheel Covers

These semi-domed aluminum wheel covers provide clearance over wheel collars and can be mounted securely in minutes. They've been designed to fit Du-Bro's 4- to 6-inch Treaded Lightweight and TV Series wheels.

Part nos.—400WC (4 in.), 450WC (4½ in.), 500WC (5 in.), 550WC (5½ in.), 600WC (6 in.); **prices**—$8, $8.25, $8.50, $8.75, $9.

Du-Bro Products Inc., P.O. Box 815, Wauconda, IL 60084; (847) 526-2136; fax (847) 526-1604; orders (800) 848-9411.

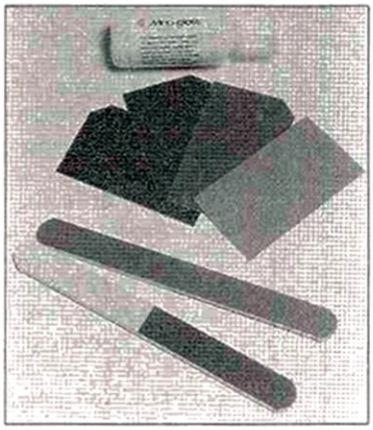
LITTLE-GEM PRODUCTS

Air-Bleed Carburetor

This true air-bleed carb fits the Cox TD .010 engine and allows it to be fully throttled between 7,000 and 25,000rpm. For more information, contact Little-Gem Products.

Price—$22.50 (plus $2.25 S&H).

Little-Gem Products, 9107 E. Milton, Overland, MO 63114; (314) 429-7792.



MICRO-SURFACE FINISHING PRODUCTS

Micro-Mesh Kit

Micro-Mesh is a high-end, cush ioned abrasive that comes in many forms for finishing acrylics, poly carbonates, wood, metal and painted surfaces. Each kit comes with Micro-Mesh, flannel cloth, a foam block and complete instructions.

Micro-Surface Finishing Products Inc., 1217 W. Third St., Box 818, Wilton, IA 52778; (800) 225-3006; fax (319) 732-3390.

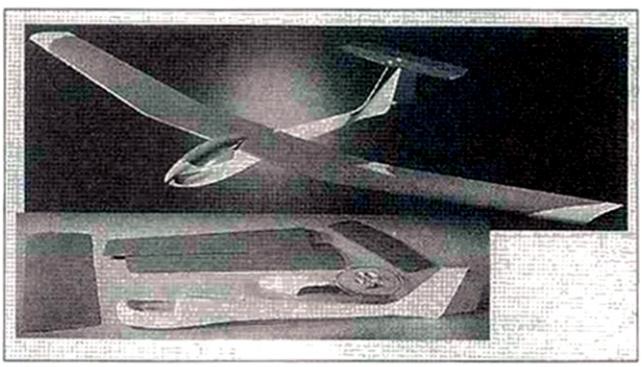
HOBBY LOBBY INTL.

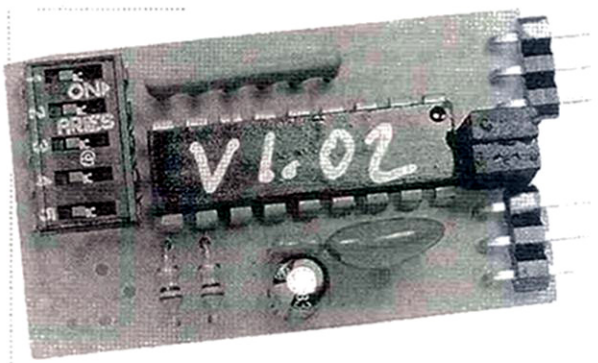
Bella U.E. and U. Sailplanes

This 59-inch-span, 30½-inch-long model is available in thermal sailplane and Speed 400 versions. The almost-ready-to-fly model weighs 13 ounces without radio and electric equipment and features a fully finished fiberglass fuselage with a built-and-covered, all-balsa wing and tail. The rudder and elevator are in place and hinged; the pushrods, wing and stab bolts and threaded inserts are also in place. The Bella has 341 square inches of wing area.

Part nos.—HLCO6610 (Bella U.E. Speed 400), HLCO6600 (Bella U.); **price**—$118.

Hobby Lobby Intl., 5614 Franklin Pike Cir., Brentwood, TN 37027; (615) 373-1444; fax (615) 377-6948.





PRECISION MICROELECTRONICS

Elevon/Flap Mixer

Designed to work with simple, inexpensive AM and FM radio systems, the EM310A mixer eases installation of elevon control systems. You can mix V-tails, flaps and spoiler, or couple rudder with aileron to make turn coordination automatic; reverse both servo outputs; and set mixing volumes to one of four rates. The 1.6x0.3-inch unit weighs ½ ounce and draws less than 2mA of power from the receiver battery pack.

Part no.—EM310A; **price**—$39.95 complete; $29.95 without servo plugs.

Precision MicroElectronics, P.O. Box 3129, Corpus Christi, TX 78463-3129; orders (512) 815-0336; information and fax (512) 814-5843.

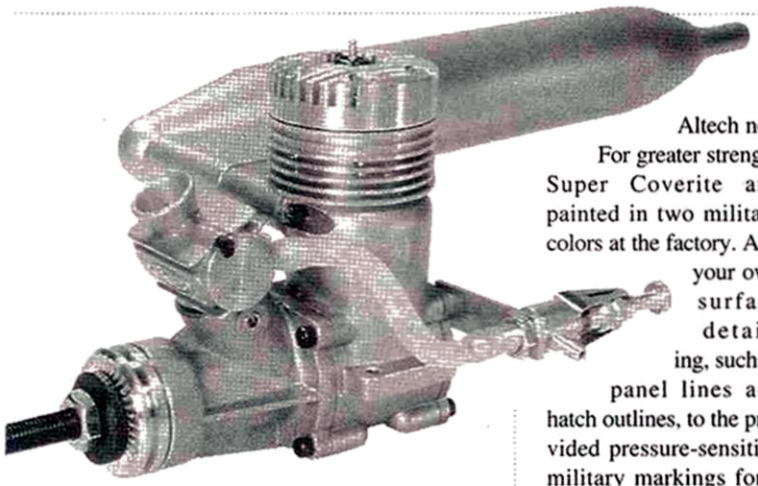
GLOBAL

de Havilland Beaver

Global's new Beaver .40 has a high-lift, flat-bottom, high-aspect-ratio wing and features working cabin doors, scale windows and wing struts, flaps (fifth channel required), sturdy, lightweight all-balsa construction, top-quality machine and die-cut parts, self-jigging tab and slot alignment, extensive hardware, fiberglass cowl, rolled plans and photo-illustrated construction manual. The wingspan is 64 inches, and either a .40 2-stroke or a .45 to .53 4-stroke is required.

Price—$119.95.

Global Hobbies, 18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (714) 964-0827; fax (714) 962-6452.



K&B

.40 ABC

This new K&B .40 features true ABC piston and sleeve technology, three oil-retaining grooves machined in the piston, remote needle-valve placement for much safer high-speed adjustment and a tuned muffler system.

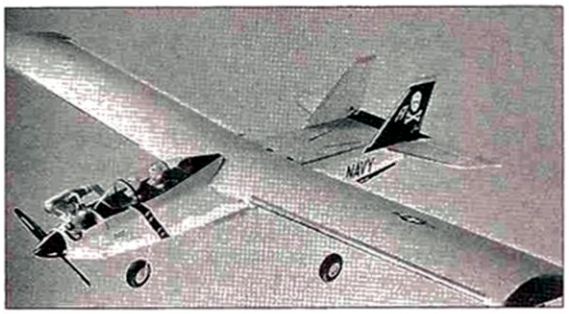
Price—$155 w/tuned muffler.

K&B Mfg. Inc., 2100 College Dr., Lake Havasu City, AZ 86406. Customer service—7 a.m. to noon and 12:30 p.m. to 3:30 p.m. MST—(520) 453-3579; (520) 453-3583.

ALTECH

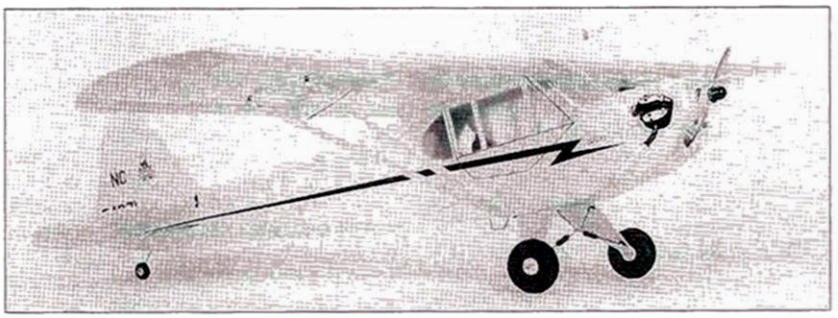
ARF Tamecat

Altech now offers the unique Tamecat in a factory-finished ARF version. For greater strength and longer life, the ARF F-14 Tamecat trainer is covered with Super Coverite and painted in two military colors at the factory. Add your own surface detailing, such as panel lines and hatch outlines, to the provided pressure-sensitive military markings for a scale-like finish. The construction is wood with foam wing-cores. The wingspan is 68 inches, and the power requirement is a .40 to .45 2-stroke or a .53 4-stroke.



Price—$269.98.

Altech Marketing, P.O. Box 7182, Edison, NJ 08818-7182; (908) 225-6144; fax (908) 225-0091.



HORIZON HOBBY DISTRIBUTORS

Hangar 9 IMAA ARF Cub

The Hangar 9 IMAA-legal ARF Cub is an all-wood built-up frame covered with Ultracote. As an example of the attention to detail, the landing gear is a scale-functioning bungee type. Other scale details include balloon tires (which have the Cub logo hubcap), N numbers and a black fuselage lightning bolt. Even the wing struts are pre-covered. The wingspan is 80 inches, and the flying weight is 6.5 to 7 pounds. The recommended power is a .40 to .45 2-stroke or a .45 to .60 4-stroke.

Price—$259.95.

Horizon Hobby Distributors Inc., 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.

CLASSIFIEDS

BUSINESS

MAKE REAL DECALS with your computer and printer. Send $10 for introductory kit to: LABCO, Dept. MAN, 27563 Dover, Warren, MI 48093. http://www.mich.com/~labco/ [2/97]

ENGINES FOR LESS: New and used save big money! O.S., SuperTigre, Fox, Enya, K&B, McCoy, Saito & more! All used engines come with lifetime tradeback guarantee! Consignment sales. Trade-in's too! Send legal-size SASE or postage to get free list to: HWC, P.O. Box 94, Boystown, NE 68010. [2/97]

ANTIQUE IGNITION - GLOW PARTS CATALOGUE, ½-inch THICK. Timers, needle valves, cylinder heads, pistons, tanks, spark plugs, race car parts. Engines ½A, Baby Cyclone, McCoys, Phantoms, etc. $10 postpaid (U.S.), $20 foreign. Chris Rossbach, 135 Richwood Dr., Box 390, Gloversville, New York 12078. [2/97]

NEW ZEALAND AERO PRODUCTS. Scale plans: Rearwin Sportster, Hall's Springfield Bulldog, Typhoon, Pawnee, Airtruk/Skyfarmer, Agwagon, Pawnee Brave, Fletcher FU-24, DC-3/C-47, Fairchild PT-19, Fleet PT-26, Cessna Aerobat, and more. Hardware Paks, color photo paks available. Free documentation with plans. Catalogue/Price list: $5 (U.S.); Visa/MC. 34 Ward Parade, Stirling Point, Bluff, New Zealand. Phone/24-hr. fax 0064-03-212-8192. [2/97]

MODEL WARPLANES, 1996: over 10,000 plans, kits, photos, 3-views listed. Send SASE to John Fredriksen, 461 Loring, Salem, MA 01970 (508) 745-9849. [10/96]

PLYWOOD—Aircraft quality Finland Birch. Call for free price list: (800) 222-7853. [2/97]

SCALE AIRCRAFT DOCUMENTATION and Resource Guide. Larger, updated 1996 edition. World's largest commercial collection. Over 5,800 different color FOTO-PAAKS and 33,000 three-view line drawings. 188-page resource guide/catalogue—$8; Canada-$10; foreign-$15. Bob Banka's Scale Model Research, 3114 Yukon Ave., Costa Mesa, CA 92626; (714) 979-8058. [2/97]

SODA-CAN AIRPLANES—replica biplane detail plans with photos $7.50 PPD, Early's Craft, 15069 Valley Blvd. SP 26, Fontana, CA 92335. [8/97]

AERO FX BY JO DESIGNS—exact-scale, computer-cut, high-performance vinyl graphics and paint masks. Lettering; nose art; insignia for scale; pattern, pylon and sport fliers; complete graphic sets available. Call or write for free sample and catalogue. JO Designs, Rt. 1, Box 225 AA, Stratford, OK 74872; (405) 759-3333; fax (405) 759-3340. [5/97]

ANTIQUE IGNITION engine parts: excellent reproductions, fuel tanks, points, timers, coils, needle valves, gaskets, etc. Champion spark plugs. Catalogue—$7 (intl. airmail—$9). Aero-Electric, 3706 North 33rd, Galesburg, MI 49053; (616) 665-9693. [1/97]

PLANS ACCURATELY ENLARGED or copied. Any scale, any size. Money-back guarantee. Send $2 for info and a customized poster for your shop. Roland Friestad, 2211M 155th St., Cameron, IL 61423. [12/96]

PLANS ENLARGING SOFTWARE—PLANS ENLARGING. Old magazines, scanning, plotting. Free information. Concept, Box 669A Poway, CA 92074; (619) 486-2464. [11/96]

HELICOPTER SCHOOL. Five days of hands-on instruction with X-Cell helicopters and Futaba and JR Radios. Small classes, tailored to meet your individual needs, beginning to expert. Includes all meals and lodging. Over 520 satisfied students from 23 countries and 44 states, logging 20,000 flights in the last seven years. Located on a 67-acre airport exclusively for R/C training. Owned and operated by Ernie Huber, five-time National Helicopter Champion and Designer. Send for free information and class schedule now! R/C Flight Training Center, P.O. Box 727, Crescent City, FL 32112; phone (800) 452-1677; fax (904) 698-4724. Outside of U.S., phone (904) 698-4275. [1/97]

DETHERMALIZING CERTAINTY. For most free-flight models. Weighs .7 - 1.2 grams. Large SASE to Wheels & Wings, P.O. Box 762, Lafayette, CA 94549-0762. [3/97]

MIXERS & RETRACT CONTROLLERS! MicroMixer for flaperons, elevons, V-tails, flying wings! MicroRetracts sequences 3 servos in slow motion from one channel! These are tiny ⅓-ounce airborne computer controllers for standard radios! Without connectors, $29 each plus $2.25 shipping. Quillen Engineering, 561 N. 750 W., Hobart, IN 46342 (219) 759-5298. [1/97]

LARGE-SCALE SAILPLANES AND TOWPLANES—new and used—call (212) 879-1634, Sailplanes Unlimited, 63 East 82nd St., New York, NY 10028. [5/97]

R/C SKYDIVING: Thrilling free-falls, chute opens by transmitter. Parafoil Parachute duplicates all canopy maneuvers, turns, stalls, spirals, landing flares, etc. Latest catalogue $1. R/C Skydivers, Box 662M, St. Croix Falls, WI 54024. [3/97]

PLANS—R/C sailplanes, scale, sport and electric. Old-timer nostalgia and FF scale and sport-powered, rubber and towline. All models illustrated. Catalogue $2. Cirrus Aviation, P.O. Box 7093, Depot 4, Victoria, BC V9B 4Z2 Canada. [3/97]

FOUR SCALE CATALOGUES. SPPS 171 superscale plans; SPPS 130,000 documentation photos, three-views; Nexus scale plans handbook; Nexus scale drawings; $5 each, Canada & USA. Add $5 each air overseas. Pepino's Scale Plans and Photo Service, 3209 Madison Ave., Greensboro, NC 27403; (910) 292-5239; Visa, Mastercard. [11/96]

VINYL LETTERS, GRAPHICS & PINSTRIPES precisely cut to your specifications and pre-spaced for easy application, professional results. Free catalogue. Comp-U-Cut, 976 W. Foothill Blvd. Suite 328, Claremont, CA 91711. (909) 624-2906. E-Mail to: ddmc@cyberg8t.com [1/97]

BOEING 80A SCALE PLANS: 72-inch wingspan. Send SASE and $2 for information and picture. Sam Moss Productions, 909 Colebrook Dr., Santa Maria, CA 93454. (805) 739-9130. [11/96]

***SAITO* ENGINE REPAIRS:** Now available at A-Train Hobby by the Oldtimer. Other gas engine repairs also available. A-Train Hobby, 13503B Southeast Mill Plain Blvd., Vancouver, WA 98684; (360) 944-5403. [12/96]

GIANT-SCALE PLANS BY HOSTETLER. Send SASE to Wendell Hostetler's Plans, 1041 Heatherwood B, Orrville, OH 44667. Phone (330) 682-8896; fax (330) 683-5357. [6/97]

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R/C PHOTO CLASSIFIEDS MAGAZINE. Black and white photo advertisements of new and used radio-control equipment. Free individual advertisements. Just send a picture of your equipment with a 25-word or less description, and see it sell in the next issue. Subscription, $24 for 12 issues or $3 for a single issue. Send the advertisements and subscriptions to P.O. Box 17238, Encino, CA 91416. RCPHOTOCLS@AOL.COM or (818) 417-8737. [11/96]

WW I SCALE KITS—PFALZ DIII, LVG C.VI, SPAD XIII. All three @ 1/6 scale; SPAD XIII @ ¼ scale. $1 for color brochure. Combat Scale Models, P.O. Box 92, Hopkins, MN 55343. [2/97]

EAGLE PRINTS: Large collection of multi-colored vinyl decals of USAF, U.S. Navy, USMC and NATO. More than 130 items in stock. Diameter—15cm. $1.20 each. For illustrated color brochure and sticker sample, enclose $2 to: Eagle Prints, P.O. Box 237, 8860 AE Harlingen, Holland. [11/96]

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GEE BEE PLANS used for full-scale R-2, "Z." Ten airplanes, ⅓-1/24. Catalogue/News $4. Vern Clements, 308 Palo Alto, Caldwell, ID 83605; (208) 459-7608. [12/96]

AFFORDABLE CNC MILL. Sherline Retrofit. Complete and ready to use. For information: (847) 998-0821. [9/97]

PLANS, KITS, WW II, RACERS, GOLDEN AGE. Free flight, electric, rubber, R/C, display. New Stinson SR-10, P-40 kits. 20-page catalogue, $3.50. Bell Model Aircraft Co., 650 Pinecrest Dr., Largo, FL 33770. [1/97]

SUNGLASS DISCOUNTS—Serengeti, RayBan, Randolph, Vuarnet, Gargoyles, bollè, Swiss Army, Hobie. Free catalogue. RJS Accessories (800) 226-7571. [3/97]

EXPERIENCE, INGENUITY, SOLID CRAFTSMANSHIP. We build from kits, plans, scratch, or your imagination. Service fully guaranteed. Hangar Heins R/C Aircraft; (513) 528-7221. [3/97]

WW I PLANS—Over 600 in stock. Laser cut parts. Send $5 for illustrated catalogue to Clarke Smiley, 23 Riverbend, Newmarket, NH 03857. [3/97]

R/C WORLD, ORLANDO, FL, 3 bedroom, 2 bath condo for sale. Weekly and monthly rentals available. Call or write, Jim Iannuzzi, 1444 Skybolt Court, Orlando, FL 32825; (407) 282-4387. [1/97]

HYDE CUSTOM SOFT MOUNTS: Information/prices: Merle Hyde, 3 Golfview Dr., Henderson, NV 89014; (702) 269-7829. [1/97]

PLAN: Giant fun-scale 1911 Sommer monoplane. Wingspan 88"; 18 to 20 lbs. Four channel. Power G-38, three sheets rolled, shipped in tube $30, $5 shipping. Make checks payable to Wally Zober, P.O. Box 2415, Apopka, FL 32703. [1/97]

AIRCRAFT CLOCK REPAIR by Swiss Master Watchmaker. Micrometric mechanical engineering craftsmanship. (800) 735-2090; http://adpages.com/orbznses/mcrometr.htm. [12/96]

MODEL ENGINE WORLD: England's engine magazine. Workshop hints, engines past and present, reworking, engine tests, construction and more. $45/12 issues. M.O. or check to: R. Palmer, P.O. Box 609, Palisades, NY 10964. Dept: MAN. [1/97]

SOUTHWEST HOBBY SUPPLY: Thousands or R/C and modeling products. Send $2 for our latest catalogue; includes coupon for 10% off first order. P.O. Box 7021, Champaign, IL 61826-7021. [1/97]

1997 CALENDAR: Florida's most beautful women posing with some of the world's most famous R/C aircraft; (407) 359-5387. [12/96]

COMBAT FLEA: 1/2A R/C, 24" wingspan, 190 sq. in., 12 ounces, aileron/elevator. Foam wing. Builds fast. Ballistic verticals! $29.95 US$. Send SASE for more info. Erbach R/C, 3507 King St., Regina, SK, Canada S4S 2J2. [11/96]

MEDIEVAL REAL SWORDS; battle swords; exotic daggers; armors different lengths; letter-opener swords 7" 24K gold inlaid—$30. Send $2 colored catalogue. A. Garnet, 856 Upper James #293, Hamilton, Ontario, Canada L9C 7M8. [1/97]

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HOBBYIST

WANTED: Model engines and racecars before 1950. Don Blackburn, P.O. Box 15143, Amarillo, TX 79105; (806) 622-1657. [10/97]

PAYING $200 each for the following toy metal outboard boat motors: Mercury MK-1000 (black), 35 HP Oliver, 60 HP Gale Soverign, also buying others. Gronowski, 140 N. Garfield Ave., Traverse City, MI 49686; (616) 941-2111. [10/96]

ENGINES: IGNITION, GLOW, DIESEL—new, used, collectors, runners. Sell, trade, buy. Send $3 for huge list to Rob Eierman, 504 Las Posas, Ridgecrest, CA 93555; (619) 375-5537. [5/97]

MAGAZINE BACK ISSUES—*American Modeler, American Aircraft Modeler, Aeromodeller, Model Airplane News, Model Aircraft, RCM* and more; 1930s–1990s. For list, send SASE to Carolyn Gierke, 1276 Ransom Rd., Lancaster, NY 14086. [3/97]

WANTED: ignition model engines 1930s to 1950s, especially Elf, Baby Cyclone, Brown Jr., Ohlsson Custom and Gold Seal. Also model racecars, any parts, spark plugs, etc; Woody Bartelt, 3706 North 33rd, Galesburg, MI 49053; (616) 665-9693, or (800) 982-5464. [1/97]

CASH FOR ENGINES: ignition, glow, diesel–all types; any condition; sale list, too! Estates my specialty! Send SASE for list. Bob Boumstein, 10970 Marcy Plaza, Omaha, NE 68154; (402) 334-0122. [11/96]

WANTED: Old, unbuilt, plastic model kits from '50s and '60s. Send list, price to Models, Box 863, Wyandette, MI 48192. [2/97]

COLLECTION FOR SALE: Over 350 kits from 40's, 50's, 60's, F/F, R/C, U/C, Rubber, Solids, Jetex. Send SASE ($.55) to Dr. Frank Iacobellis, 62 Palisade Rd., Rye, NY 10580, or call (914) 967-5550. [11/96]

MODEL MOTORS WANTED: most types, 1970 and earlier. Cash or trade. T. Crouss, 100 Smyrna, West Springfield, MA 01089. [12/96]

WANTED: Model engines and racecars before 1956. Don Blackburn, P.O. Box 15143, Amarillo, TX 79105; (806) 622-1657. [12/96]

WANTED: Built or partially built scale Cessna 150, 152, or 172. Glen Mills, P.O. Box 3393, Mission Viejo, CA 92690; phone (714) 768-0585; fax (714) 458-6455. [12/96]

WANTED COX BOATS: Water Wizard, See Bee. Hydro-Blaster. Dean, 4032 Iowa St., San Diego, CA 92104. [12/96]

DEBOLT PLANS: radio control, control line, free flight. Separate SASE for each list. Fran Ptaszkiewicz, 23 Marlee Dr., Tonawanda, NY 14150. [3/97]

MODEL AIRPLANE NEWS, 1930-1980; "Air Trails," 1935-1952, "Young Men," 1952-1956; "American Modeler," 1957-1967; "American Aircraft Modeler," 1968-1975. $1 for list. George Reith, 3597 Arbutus Dr. N., Cobble Hill, B.C., Canada VOR 1L1. [3/97]

CLUBS, RC enthusiast now buying suitable property to rent to flying clubs. William Miller; 813) 862-0806. [11/96]

FOR SALE: Short blast R/C hot-air balloon—$400, or best offer. Call John (501) 741-0063. [11/96]

TOY METAL OUTBOARD BOAT MOTORS WANTED: Mercury, Johnson, Fuji, Oliver, Gale, Evinrude, Orkin, Sea-Fury, Scott. Gronowski, 140 N. Garfield Ave., Traverse City, MI 49686-2802; phone (616) 941-2111. [1/97]

A-J FIREBALL, flown, motorless, original box, attic stored. Anyone interested? Bob (610) 834-1932 (home); (215) 842-6955 (work). [1/97]

FOR SALE: leaving R/C temporarily for scale scratch-building. All items are still in original boxes unused. Pilot kit for 1/5.2 PT-19 all balsa 74" span—$250, O.S. FS-61—$325. Circus Hobbies Marchetti SF-260-45 kit w/glass fuse—$225. (2) Futaba PCM 1024—$300 each. Shipping included. Jay Ray, 3735 Singletree Rd., Charlotte, NC 28227; (704) 545-1232. [12/96]

SAITO 300TTDP: NIB, $825/offer. (407) 777-7890. [12/96]

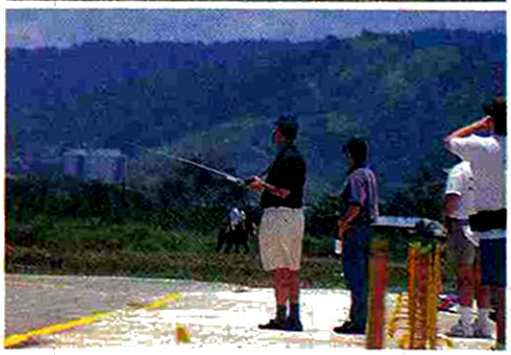
RATES: non-commercial—25 cents per word (no commercial ads of any kind accepted at this rate); commercial— 50 cents per word (applies to retailers, manufacturers, etc.); count all initials, numbers, name and address, city, state, zip code and phone number. **All ads must be paid for in advance.** To run your ad for more than one month, multiply your payment by the number of months you want it to run. Deadline: the 10th day of the month, 3 months in advance, e.g., *January 10 for the April issue.* We don't furnish box numbers, and it isn't our policy to send tear sheets. Please make all checks and money orders in U.S. funds, payable to: **AIR AGE, INC. SEND AD AND PAYMENT TO: CLASSIFIED ADS, Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606 or call (203) 431-9000.**

ADVERTISER INDEX

Final APPROACH

JETS OVER PUERTO RICO

WANT TO go to a well-organized jet rally and enjoy a tropical beachfront/casino vacation while you're at it? If you responded, "Sounds like a well-rounded getaway to me!" I recommend that you go to the next Jets Over Puerto Rico this coming May. I can tell you firsthand that you will not be disappointed. It's complete with a 700-foot runway, ample pit area with awnings, concession stands, a vast parking area and a general friendly atmosphere. Event promoter and all-around gentleman Felipe Vidal has set the stage for a very special event—an event flavored with open-arm hospitality for which the Puerto Rican people are so well-known. Felipe shows his appreciation to the pilots by making sure they are well taken care of and to the spectators by making sure they are entertained.



The event is a low-stress fly-in, much like the atmosphere of an IMAA meet. The tense competitive environment for which jet meets have become famous (or infamous, depending on your view of things) is absent. The competition that did take place was upbeat. Events such as Shortest Takeoff and Speed Record Runs kept the pilots more relaxed and the spectators involved. And involved they were. After Garland Hamilton set a new record of 249.5mph with his bright-yellow Bob Violett Models Aggressor, he was busy signing autographs for the better part of an hour. Oh yes, the Shortest Takeoff was won by Jose Travieso in a hair-raising 85.25 feet. With its full-brake, full-power starts, this entire event was, to say the least, riveting. Too bad there wasn't a Shortest Flight award. Yes, there was a smoking hole or two in the ground as a result—a complete event in its own right.

Garland Hamilton and his record breaking, 250mph BVM Aggressor.

Departure from traditional competition notwithstanding, the first Jets Over Puerto Rico managed to attract honorary "jetsters," such as Terry Nitsch, Jerry Caudle, Tom Cook, Bob Violett and the venerable Frank Tiano who, with his F-86 in Japanese colors, showed onlookers the true meaning of a "Kamikaze afterburner." Frank's large, smoking hole in the ground was dubbed "Fuji-san of the Caribbean"!

In short, everybody had a tremendous amount of fun at a very professionally run fly-in on a beautiful tropical island; who could ask for more? Certainly not your wife. Yours truly was so tuckered out from all that fun that I had to relax with more fun. I rented a sailboat in front of my exquisite hotel and sailed out to the barrier reef, conquering the blue lagoon that painted the view from my balcony. Everything was so perfect I couldn't take it! I had to organize a mutiny against myself! Part of me is still out there in search of Atlantis and the wreckage from Frankie-san's crash.

For information, contact Felipe Vidal, P.O. Box 5309, Caguas, P.R. 00726 or call (787) 747-9415; night phone (787) 272-5708. —*Chris Chianelli*